Socioeconomic Assessment

of the Carson National Forest

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Abbreviations

AUMs	Animal Unit Months
BLM	Bureau of Land Management
CFRP	Collaborative Forest Rehabilitation Program
DOD	Department of Defense
ESA	Endangered Species Act
FS	Forest Service
IRAs	Inventoried Roadless Areas
MSA	Metropolitan Statistical Area
NF	National Forest
NLCD	National Land Coverage Data
NMDOT	New Mexico Department of Transportation
NVUM	National Visitor Use Monitoring
OHV	Off Highway Vehicle
RD	Ranger Districts
ROW	Right-of-Way
VMS	Visual Management System

Executive Summary

This report is a characterization of the socioeconomic environment of the Carson National Forest (NF) and explores relationships and linkages between United States Forest Service (FS) managed land, visitors and surrounding communities. The principal finding of this study is that visitor spending in the Questa Ranger District (RD) is the largest and most influential contributor to the economic impact of the Carson NF. The Questa RD attracts the most visitors to the forest, especially for winter recreation activities such as skiing and snowshoeing. Additionally, the region's history of ranching and traditional land use in northern New Mexico has culminated in a deep-rooted value for preserving the quality of life characteristics of rural agricultural communities.

About 60 percent of the Forest is located in Rio Arriba County, the largest county in the assessment area. Taos County has the highest proportion of managed land, with 40% of its acreage covered by the Carson NF. About seven percent (104,967 acres) of the NF is owned by other entities, including private landowners.

In and around the forest are areas managed by other agencies, such as the Bureau of Land Management (BLM) and other federal entities (Bandalier National Monument, Valles Caldera National Reserve). The key stakeholders in the Carson NF extend beyond the various land managers as areas in and around FS managed-land are accessed by residents and other user-groups from diverse socioeconomic and cultural backgrounds and each has a stake. Each group represents different, and often opposing, expectations of the services and management obligations of the FS.

Much of the quantitative data used for this report are available only at the county-level. Thus, county boundaries define the parameters of much of the data and determine the assessment area – the area includes only New Mexico counties that are contained or touched by the six ranger districts of the Carson NF. The assessment area is comprised of four New Mexico counties (8,829,073 acres). Six ranger districts (RDs) comprise the Carson NF: Tres Piedras (24%), Canjilon (10%), El Rito (19%), Questa (12%), Camino Real (24%) and Jicarilla (11%).[1]

Demographic and Socioeconomic Trends

The population increased in the assessment area between 1980 and 2000. Real per capita income rose in the four counties between 1990 and 2000. More people with more income in the assessment area may be expected to impact forest uses. In rural economies more dependent on agriculture and other land uses that involve extraction from the forest lands (e.g., grazing, wood gathering, piñon harvesting, etc.), management decisions could have lasting impacts on the wealth and well-being of certain populations. Counties where poverty is most prevalent are primarily rural counties, those with high percentages of minority populations, those that exhibit lower levels of education, and those with more housing without indoor plumbing facilities.

Over the past two decades, much of the logging industry has faded in this part of New Mexico. Grazing on public lands has been curtailed and ranches are experiencing hardships as they struggle to remain economically viable. Further, mines in Colfax and Taos Counties have closed. However, the Carson NF attracts visitors for an increasing number of recreational uses. The local tourism industry has expanded, a characteristic related to increasing amenity migration and greater investment in vacation homes.

[1] Percentages indicate the proportion of Carson NF that covers each county.

Access and Right of Way Issues

The largest and only major airport in New Mexico is the Albuquerque International Sunport, serving roughly six million travelers a year. However, this airport is more than one hundred miles from any part of the Carson NF.

In all four counties, there are only 165 miles of urban road and over 12,000 miles of rural road. Rio Arriba County has the lightest traffic, with about 158 vehicles traveling any given stretch of road on a typical day. However, the area has the most miles of roads. Taos County had the heaviest traffic in the assessment area, but it is still quite low relative to the rest of the state.

Forest roads provide access for both forest users and FS officials to areas of interest in the Carson NF. In some areas, forest roads allow the only access to complete maintenance and rehabilitative activities. In all, the Carson NF features almost 11,000 miles of forest road. When there are right-of-way issues, the FS tries to resolve them by purchasing easements which follow an existing trail or road through the property. In cases where the FS is unable to secure an easement, another strategy is to construct an alternative trail or road that goes around private property. However, this is more costly than purchasing an easement. Whenever changes to public lands are proposed the FS must first conduct an Environmental Impact Study (EIS) to determine the possibility of negative impacts on habitats, wildlife, and watersheds.

As part of a national mandate, all National Forests in New Mexico are currently involved in Travel Management Planning. This process, which includes the solicitation of public comment, is an effort to designate certain roads and areas for motor vehicle use and minimize damage caused by unmanaged recreation.

Land Cover and Land Ownership

About 60% of the Carson NF (928,139 acres) is covered by coniferous forest. Grassland is the second most common land cover, making up about 23 percent (359,737 acres). The Tres Piedras RD is the largest RD (388,147 acres) and about half of the district is covered by grassland (185,515 acres). Overall, there are 105,010 acres of the Carson NF that are privately owned, comprising approximately seven percent of the entire Forest. The two most common land covers, evergreen forest and grasslands, have differing proportions of land owned by private interests. Only four percent of evergreen forest acres are owned by private landowners, whereas 12 percent of the grasslands are owned by private interests.

Invasive species have been characterized as a "catastrophic wildfire in slow motion."[2] Non-native, invasive plants and insects can cause major disruptions in ecosystem function. Invasive species can reduce biodiversity and degrade ecosystem health in forest areas. The damage caused by invasive organisms affect the health of not only the forests and rangelands but also of wildlife, livestock, fish, and humans.[3]

[2] Fred Norbury, Assoc. Deputy Chief, FS. (2005). Statement before the Subcommittee on Public Lands and Forests, Committee on Energy and Natural Resources. http://energy.senate.gov/public/index.cfm?FuseAction=Hearings.Testimony&Hearing_ID=1500&Witness_ID=4269.

[3] USDA FS. Invasive Species Program. USDA FS Website. http://www.fs.fed.us/invasivespecies/definition.shtml.

Most invasive weeds are thistles (biennials and perennials), saltcedar, and Siberian elm. An example in the Carson NF area is the Canada Thistle (*Asteraceae*), which is common in the higher elevations of northern and central New Mexico. According to FS staff, Canada Thistle is present along roadways and is beginning to show in riparian areas.

The most threatening invasive insect species are variations of the bark beetle, an insect native to the region. Drought conditions weaken trees' vigor making it more difficult to survive beetle damage. As trees die from beetle attacks, the dead trees increase the fuel levels, resulting in heightened fire danger. In the Carson NF, species include the fir engraver (*Scolytus ventralis*), the piñon ips *(Ips confuses)* and the five-spined ips *(Ips lecontei)*.

Continued drought conditions combined with high fuel loadings have created dangerous conditions for much of the West. Some 26 million acres in the West have been identified as fuels treatment "hot spots" or high priority areas. FS officials have compared the current moisture and fuel loading conditions to those immediately prior to the Hondo Fire and the Cerro Grande fire; both had catastrophic effects scorching thousands of acres of land and homes.

Land Uses and Users

Recreation is the primary use of the Carson NF. However, recreation is concentrated in a few areas. The El Rito and Jicarilla RDs have few designated recreational sites, while the Questa and Camino Real RDs each have over 30. Also, the ski areas on the Questa RD are a major attraction for recreational visitors. Data collected by the FS indicates that at least 1 million people visited the Carson NF in 1999-2000. By far, most visitors are local residents taking day trips to the forest for recreational purposes.

Hunting occurs in areas ranging from the sub-alpine peaks of the Sangre de Cristo Mountains to the high plains near San Antonio Mountain, depending on one's game preference. Common game species in the Carson NF include Merriam's Turkey, Pronghorn Antelope, Mule Deer, Bighorn Sheep and Elk.

Grazing is one of the Carson NF's primary uses and is certainly embedded in the culture and history of the local residents. Although it is not a major economic force, ranchers engage in this traditional activity because it is part of their heritage. Livestock animals are important components of household economies, but most of the small ranchers no longer depend on their crops and animals as their sole source of income. Also, grazing activities are regulated by the United States Congress.

As there are different land uses, there are as many different land users and stakeholders. Recreational visitors, long-time residents, recent migrants and tribal members all have different expectations and needs from the land and the FS.

Special Management Areas

Within the Carson NF are 86,193 acres of wilderness. Wilderness is a formal designation, which brings restrictions such as: no mechanized travel (including bicycles) and no camping within 300 feet of wilderness lakes. The wilderness areas are: Wheeler Peak, Latir Peak, Cruces Basin and parts of the Chama River and Pecos Wildernesses.

In addition to wilderness areas, inventoried roadless areas are special management areas. However, they are the focus of litigation all over the United States. Recent developments and changes in the "Roadless Rule" have captured the attention of forest users, advocacy organizations and business interests. Decisions as to how the land should be used and managed have substantial implications to the socioeconomic characteristics of the forest assessment area. For example, allowing road construction in particular areas may compromise the cultural integrity of some areas or jeopardize wildlife habitats. This could alienate traditional forest users and anger some wildlife preservation organizations. However, not allowing road construction limits the ability of the FS to maintain the forests' health, by thinning for example, resulting in increased fire danger – threatening wildlife habitats and the forest at large.

The Carson NF features over 80 designated recreational sites. The Questa RD has the most recreational sites with 35 out of the Forest total of 81. The district also has two of the three ski areas, which bring in the most visitors.

Economic Impacts

The data presented in this section describe a region that is significantly oriented toward retail and service industries, though Mora County is an exception. As such, the most important economic aspect of the use of the Carson NF is the revenue generated by recreational visitors. This is not to neglect the primary industrial uses of the forest land, but the main economic concerns of the region with respect to the forest are likely oriented toward maintaining or extending recreational use. This is particularly true for ski visitors, who make up a substantial portion of recreation and, at least in Taos County, are a very important source of revenue during the otherwise non-tourist winter season.

Ski visitors generated a total of $67.8 million in revenues, 1,140 jobs, and $29.4 million in additional labor income. Visitor spending is by far the largest source of activity, contributing a total of 84 percent of the employment and 82 percent of the labor income impacts. The FS is the second largest contributor in terms of both employment and income, while ranching also contributes significantly, but the impacts of timber harvesting are negligible.

Though there is unlikely to be any significant economic impact directly from the extraction of oil and gas, the local region does receive benefit in the form of state and local taxes and FS tax disbursements for transportation and road costs. In the Carson NF, oil and gas extraction occurs in the Jicarilla Ranger District, which lies in the Chama Municipality in Rio Arriba County

Community Relationships

According to data collected from the USAD Forest Service, the Carson NF benefited from the work of about 228 volunteers between 2003 and 2005. Further, the FS has an extensive history of working with local communities and other government agencies on various projects, ranging from economic development to forest health and sustainability. These partnerships are an indispensable method of managing operations and conducting business. They play a vital role in achieving goals that the FS might not meet alone. Data provided by the FS shows that over 200 community organizations and businesses partner with the FS on various projects throughout New Mexico.

1 Introduction

Named for the noted frontier scout, Kit Carson, the Carson National Forest (NF) in northern New Mexico boasts some of the most famous landscapes in the country. The Forest features the Sangre de Cristo Mountains, which includes Wheeler Peak. At 13,161 feet, it is the highest point in New Mexico. The Forest also has perennial streams, small lakes, alpine valleys and meadows, all providing excellent forage for wild animals and domestic livestock. The forest provides year-round recreational opportunities, such as skiing and snowmobiling in the winter and abundant fishing and hiking in the summer. The land in the Carson NF is used mostly for recreation and livestock grazing. The region has a long history of land use characterized by conflict and controversy dating back to the days of Spanish colonialism. The socio-cultural aspect of land uses and users, historical and contemporary, is an integral part of the role played by the forest in northern New Mexico.

As shown in **Figure 1.1**, the Carson NF consists of four contiguous land areas clustered near the center of the New Mexico-Colorado border. Some of the southern borders of the forest abut the Santa Fe NF. The Carson NF encompasses 1.5 million acres across four counties in Northern New Mexico: Rio Arriba, Colfax, Taos and Mora Counties.

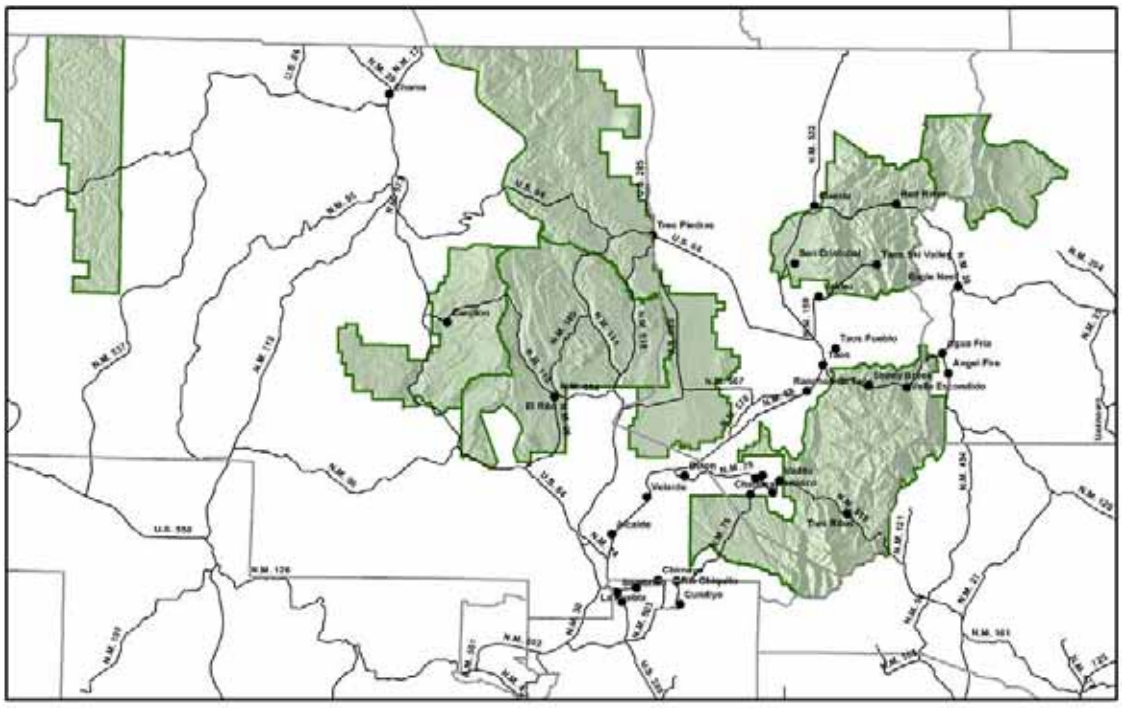

Figure 1.1: The Carson NF

1.1 Statement of Purpose

This report provides information and analysis of the socioeconomic environment of the Carson NF, including the relationships between Forest Service (FS)-managed land, visitors, and surrounding communities. Specifically, this report:

- Documents and analyzes the current contributions of Carson NF to the socioeconomic

and cultural vitality of the communities neighboring the public land;
- Identifies and evaluates national, regional, and local trends that may shape these contributions during the coming years; and
- Explores Opportunities and Challenges that the FS and the public confront as they work to broaden and deepen relationships between forest land, visitors and neighboring communities.

The purpose of the report is to assist the FS and the public in developing a forest management plan.

1.2 Sources of Information and Analytical Methods

Information in this assessment is largely drawn from secondary data sources. Specifically, data for this report comes from:

- Demographic and economic data sets, including those available from the United States Census Bureau and the Bureau of Economic Analysis;
- Administrative, land management, and resource data, mostly provided by the FS and the Bureau of Land Management; and
- Contextual and historical information, obtained from archival sources such as newspapers, internet sites, and trade journals.

Throughout this report, an effort is made to undertake analysis on the local scale, for example, considering differences among communities within individual counties. However, the structure of data sources often constrains this effort. Demographic and economic data sets are in many cases available only on the county level; it is not possible to further disaggregate this data to the community level. Similarly, administrative data provided by the FS is often at the Forest level (for Carson NF as a whole), and it is likewise impossible to further disaggregate the data to the ranger district level.

1.3 Assessment Area

Carson NF plays a unique role in the lives and activities of visitors, residents and land managers in northern New Mexico. Northern New Mexico is characterized by a history of disputes concerning the role of state and federal agencies in land management. In New Mexico's six north central counties (Mora, Rio Arriba, Sandoval, San Miguel, Santa Fe and Taos), approximately 34 percent of the land is federally owned. Together, the US Department of Interior's Bureau of Land Management (BLM) and the FS manage about 52 percent of the land in Rio Arriba County and about 53 percent in Taos County[4].

It is important to consider the region's history because it still influences forest planning and decision making today. Adjacent to the Carson NF are Indian reservations, pueblos and active land grant communities. The combination of different landowners and interests makes forest planning and decision making a complex process for the FS. To make matters more complex,

[4] Raish, C. and McSweeney, A.. (2001) "Livestock Ranching and Traditional Culture in Northern New Mexico." *Natural Resources Journal*, vol. 41. p713-730.

many residents in these communities perceive forest land to be their private land, as it belonged to their ancestors before the FS was created.[5]

The assessment area is comprised of four New Mexico counties that contain the Carson NF land: Rio Arriba, Colfax, Taos and Mora. The total land area of these counties is 8,829,073 acres. Administratively, the Carson NF is comprised of six ranger districts (RDs): Tres Piedras (24% of the Carson NF), Canjilon (10% of the Carson NF), El Rito (19% of the Carson NF), Questa (12% of the Carson NF), Camino Real (24% of the Carson NF) and Jicarilla (11% of the Carson NF).[6] **Figure 1.2** is a map of the Carson NF assessment area.

1.3.1 Brief History of Carson NF and its Assessment Area

Northern New Mexico has a historical record unlike any other in the state, and even the country, considering the region's history of conquest, land ownership and land use. The Hispano ranching tradition in what is now New Mexico began with the first Spanish colonization of the area in 1598, but did not reach its apex until the Spanish "re-conquest" of the area in the late 1690s. During colonization, the Spanish brought domesticated plants and animals from Europe, including cattle, sheep, goats, and horses.[7] Additionally, they introduced new agricultural technologies and subsistence practices to the Native Americans. During the 1600s, however, the region's Pueblo Indian populations drastically decreased in the area as a result of new diseases, warfare and famine caused by droughts and raiding nomadic Indian groups.[8]

[5] Raish, C. and McSweeney, A.. (2001) "Livestock Ranching and Traditional Culture in Northern New Mexico." *Natural Resources Journal*, vol. 41. p713-730.
[6] Carson NF Plan, 1990. USDA Forest Service.
[7] Raish, C. (2000). "Environmentalism, the Forest Service, and the Hispano Communities of Northern New Mexico." *Society & Natural Resources*, 13: 489-508.
[8] Ibid.

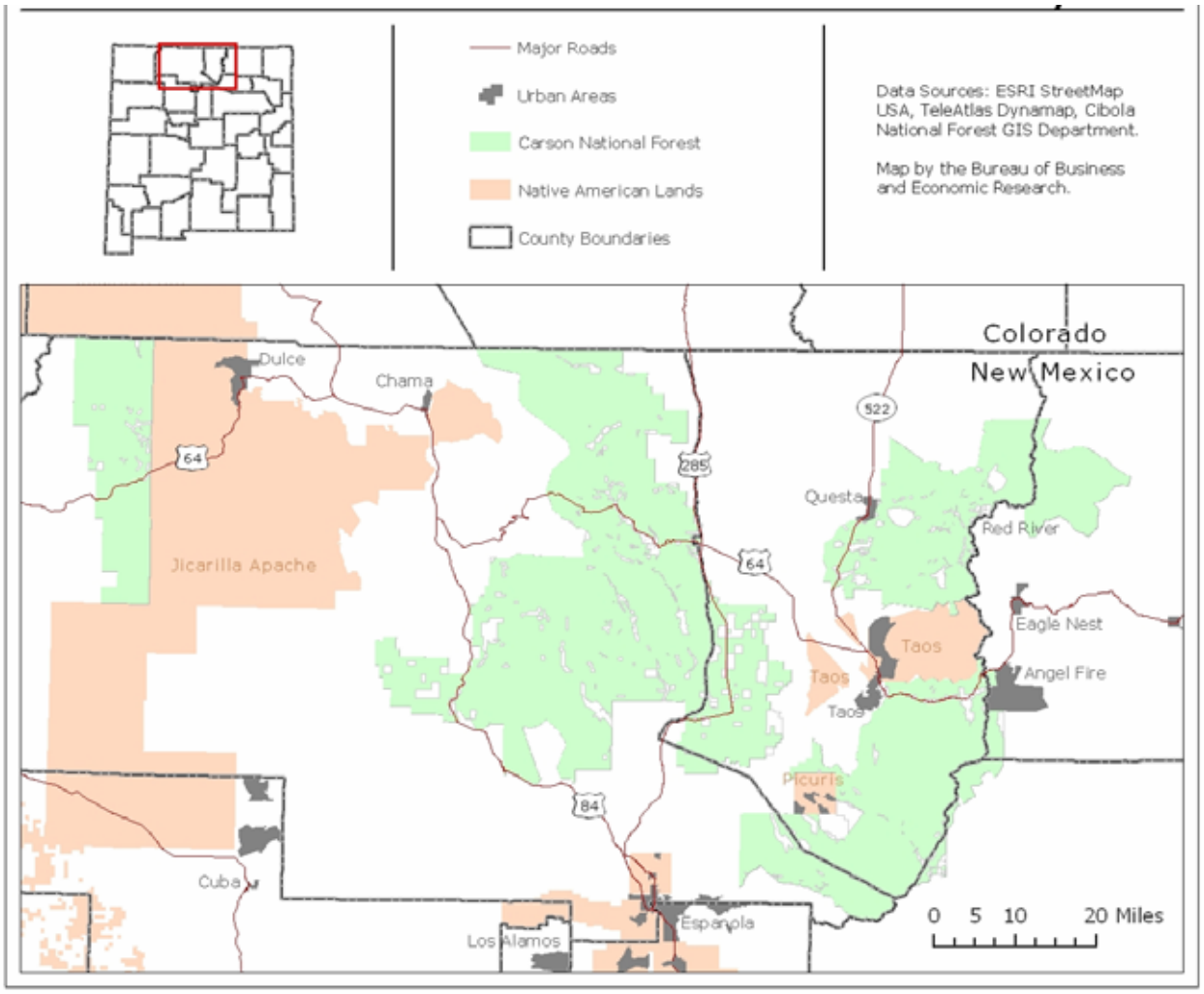

Figure 1.2: The Carson NF Assessment Area

During the Spanish Colonial (1598 to 1821) and Mexican (1821-1848) periods, land ownership and land use in the West were determined by land grants from the Spanish Crown or Mexican government. Various types of land grants were issued in New Mexico, but it is the community land grants, where groups of settlers used portions of the land grant area in common, that became the source of major land ownership conflicts in contemporary north-central New Mexico.[9]

When a community land grant was conferred, settlers generally received individually owned home sites and small plots of irrigated farmland that averaged about three to 12 acres and had access to the common lands of the grant for grazing, timber and livestock pasturing. Both animals and plants were part of an integrated subsistence farming strategy used by the settlers. Sheep and

[9] Treaty of Guadalupe Hidalgo: Definition and List of Community Land Grants in New Mexico. (2001) United States General Accounting Office.

goats were most frequently used for food whereas cattle were used for plowing, threshing, transporting produce and fertilizing fields.[10]

With the American conquest of the region after the Mexican-American War, patterns of land ownership changed drastically, resulting in ownership decisions still in effect today. In 1848, the U.S. and Mexico signed the Treaty of Guadalupe Hidalgo, whereby the U.S. agreed to recognize the property rights of the former Mexican citizens to land within the new boundaries of the U.S. However, land titles were not automatically confirmed as claimants had to apply for title confirmation according to procedures that varied depending on the location of the land.

During the later nineteenth and early twentieth centuries, much of the land that had confirmed titles was lost as well. It was common that villagers could not afford the property taxes excised by the new American system of monetary tax payments and had to sell. Even more land was lost by corrupt speculations practices of the Anglo and Spanish, and by commercial enterprises that were becoming more common in the region.[11] Owners began fencing off land and blocking access to areas that were traditional, non-grant, parcels of land used for grazing and farming. In total, it is estimated that the U.S. settlement of the area resulted in the alienation of eighty percent of the Spanish and Mexican land grants from their original owner.[12]

In 1906, the Taos Forest Reserve was created. Two years later, the Taos NF and part of the Jemez NF were merged to create the Carson NF. In 1923, 63,708 acres in Taos County were transferred from the Santa Fe NF to the Carson NF.[13]

Table 1.1 lists the counties in the assessment area and shows the proportion of land that is owned by the FS. About 60 percent of the Forest is located in Rio Arriba County, the largest county in the assessment area. Taos County has the highest proportion of FS managed land, with 40 percent of its acreage covered by the Carson NF. About seven percent (104,967 acres) of the NF is owned by other entities.

Table 1.1: Forest-Owned Land by County (Acres)

	Forest Service Owned	Other Owned	Total Carson Acres in County	Total Acres in County	% of County Area Covered by Carson
Colfax	70,222.80	1,210.29	71,433.09	2,409,809.39	3%
Mora	16,823.47	1,786.44	18,609.91	1,236,469.19	2%
Rio Arriba	877,827.48	50,105.46	927,932.93	3,772,882.06	25%
Taos	517,931.33	51,864.45	569,795.78	1,409,912.06	40%
Total Carson Counties	**1,482,805**	**104,967**	**1,587,772**	**8,829,073**	**18%**

Sources: Cibola National Forest GIS Department and ESRI Arc GIS Street Map USA 2004
Calculations: Done by UNM-BBER.

[10] Raish, C. and McSweeney, A.. (2001) "Livestock Ranching and Traditional Culture in Northern New Mexico." *Natural Resources Journal*, vol. 41. p713-730.
[11] Ibid.
[12] Westphall, V. (1965). *The Public Domain in New Mexico 1854-1891*. University of New Mexico Press: Albuquerque.
[13] Timeless Heritage: A History of the Forest Service in the Southwest. (1988) USDA Forest Service.

Generally speaking, northern New Mexico has regular winter weather patterns that provide extensive winter recreation opportunities. Ski areas include Red River, Taos Valley and Sipapu. More importantly, however, the snowfall contributes substantially to the runoff water needed throughout the Rio Grande Valley for agricultural purposes. The forest comprises some of the most productive and important watersheds in the region.

The areas in and around FS managed-land are comprised of dynamic interactions between residents from diverse socioeconomic and cultural backgrounds. Each group represents different, and often opposing, expectations of the services and management obligations of the FS. Later chapters of this report look at these divergences and the management challenges they impose and the opportunities they offer.

1.4 Carson National Forest Ranger Districts

The following sections describe each of the ranger districts (RDs), including a discussion of historical land uses, using information from the FS website and other sources. Refer to **Figure 1.3** for a map of the ranger districts.

1.4.1 Tres Piedras Ranger District

The Tres Piedras RD is located on the north- west side of the Carson NF, west of the Rio Grande Gorge. The small town of Tres Piedras is situated in the foothills of the lower San Juan Mountains, where the sagebrush and piñon-juniper country connects to the ponderosa pine foothills. The elevation of the Tres Piedras RD ranges from 7,000 feet to 11,000 feet, and the vegetation changes with the changes in elevation. Open sagebrush and piñon-juniper dominates in the lower elevations from 7,000-8,000 feet, at which point ponderosa pine ranges from 8,000 to 9,000 feet. Above 9,000 feet, fir and spruce communities dominate the landscape. Aspen is fairly common at all elevations above 8,000 feet.

The village of Taos is the closest large community providing access to most services such as a medical emergency room and a major retail center. Taos is an eclectic mix of traditional northern New Mexico culture, recreational tourism, artist communities, and upscale vacation homes. The town is also home to the Taos Ski Valley, the largest ski resort in northern New Mexico. Taos is the closest large city to Tres Piedras. Santa Fe is the largest city in the northern New Mexico area, located 90 miles from Tres Piedras.

Many of the resident families have been in the area for generations and are descendants of the original settlers. They engage in traditional activities such as raising livestock and cutting fuel wood, but these activities are only a supplement to incomes earned from their “day jobs.”[14] Residents from all around Tres Piedras commute to Taos for employment, as the local job market is limited.

A small regional airport is located 10 miles to the west of Taos, with limited service to Santa Fe and Albuquerque. However, most residents in New Mexico use the state’s major airport in

[14] J. C. Russell, J.C and Adams-Russell, P.A. (2005) Attitudes, Values and Beliefs Toward National Forest System Lands: The Carson National Forest USDA Forest Service.

Albuquerque to access commercial flights. Albuquerque is approximately a two and a half hour drive from Tres Piedras.

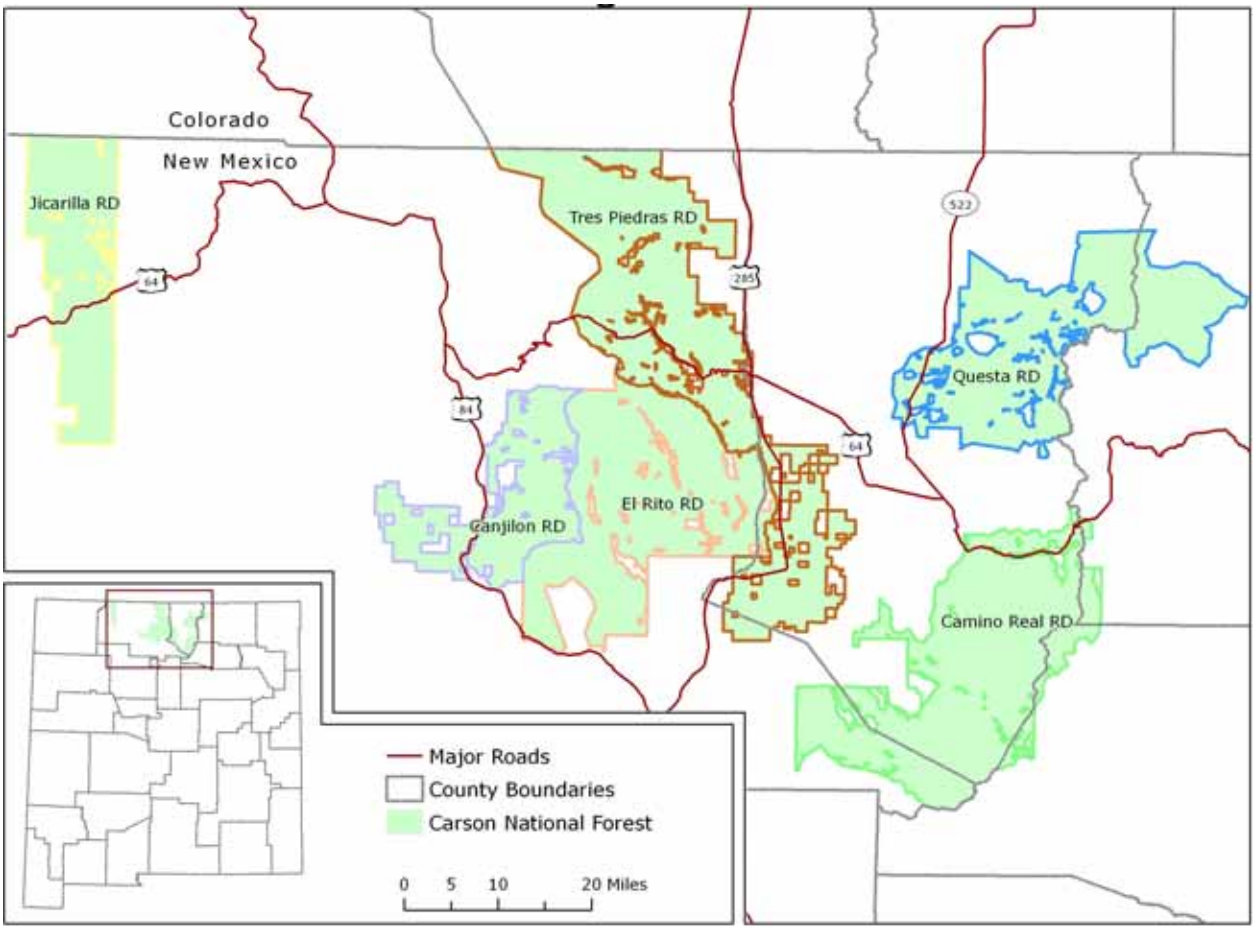

Figure 1.3: Ranger Districts on The Carson NF

1.4.2 Canjilon Ranger District

Like much of northern New Mexico, the area that is now the Canjilon RD was once Spanish land grants; many of the current residents depend on the land in the same way their forbearers did. The Canjilon RD borders BLM lands, another NF and lies between two large land grants. Using the Chama River as a natural divider, Canjilon RD abuts the Santa Fe NF's northern border. Just to the south of the river is the Chama River Valley Wilderness area, administered by the Santa Fe NF. North of the river lies Mesa de las Viejas. East of the Canjilon RD is the El Rito RD. Access to the Canjilon RD is via, US84. The small community of Canjilon is located about 50 miles south of Pagosa Springs, Colorado and about 50 miles north of Española, New Mexico.

The Canjilon RD is sandwiched between two land grants: the large Tierra Amarilla grant to the north and the Piedra Lumbre grant to the south. The Tierra Amarilla land grant was issued on July 20, 1832 as a quasi-communal grant by the Mexican government. The United States federal government confirmed all the land in the grant (594,515 acres) as legally owned by the grantee.

The Piedra Lumbre grant is 49,747 acres and was issued in 1766 by Mexican Governor Tomás Veléz Cachupín for a private settlement.[15]

The small community of Canjilon has a population of about 300 people. The village is a small patch of privately held land surrounded by FS owned land. According to the United States Census Bureau, many residents commute as much as 85 miles on a daily basis to access employment and educational opportunities in Pagosa Springs, Española and El Rito. Ranches, construction firms, state and local government and the local school system are the major employers in the area. The Village of Chama, about 35 miles away, is the closest full-service community.

Tourism and a service-based economy are developing in the Canjilon area, following national trends. Local attractions such as the Cumbres-Toltec Railroad, Heron, El Vado, Abiquiu Reservoirs and trout streams are major destinations in the summer months. Visitors also come to the area to enjoy fishing in the Trout, Lower Canjilon and Middle Canjilon Lakes. In the fall and winter months, hunting, snowmobiling, and cross-country skiing are popular activities and draw many visitors. The Continental Divide Trail runs along the border between the Canjilon RD and the Tierra Amarilla land grant and continues down to Ghost Ranch.[16]

The area has been the stage for intense conflicts between parties who believe they are the "rightful" owners of the land. In the middle and late 1960s, the formation of the Alianza Federal de Los Pueblos Libres (the Federal Alliance of Free City States) with Reies Lopes Tijerina at the helm epitomized the conflict between land grant claimants and the United States government. Tijerina and his followers were determined to take over NF lands that they claimed were part of their early land grants, regardless of Federal Court decisions dating back into the 1800s. In October 1966, Tijerina and several hundred activists crowded into Echo Amphitheatre and declared it the new state of San Joaquin del Rio de Chama.[17]

1.4.3 El Rito Ranger District

The El Rito RD, in Rio Arriba County, is just west of the Canjilon RD. The district is located in high desert, piñon-juniper country. High elevation species, like ponderosa pines, mixed conifer, spruce and aspen types are present only five miles north of the town of El Rito. The population is about 1,300 in this small ranching community. Recreation is a minor focus of the district, with only one developed recreational site. Most FS activity in the district concerns timber, rangeland and fire prevention. Currently, there are at least 10 grazing allotments with about 59 permittees.

The nearby community college, school district, and the FS are the area's major employers, with many residents commuting between 30 and 60 miles for jobs in Española, Santa Fe, Taos and Los Alamos. The nearest airports are in Taos (60 miles northeast) and Santa Fe (about 60 miles south). Albuquerque has the nearest international airport located about 130 miles south of El Rito. Española is the nearest city.

Although commercial logging was taking place in the area beginning in the early 1900s, grazing has always been the primary use of the NF by local residents. The FS perceived overgrazing to be

[15] *Land Grants in Rio Arriba and Los Alamos Counties*, The Center for Land Grant Studies, http://www.southwestbooks.org/grants_rioarriba_losalamos.htm.
[16] The Continental Divide Society. http://www.cdtrail.org/page.php?pname=about/newmexico.
[17] Timeless Heritage: A History of the Forest Service in the Southwest (1988) USDA Forest Service.

a problem and, in the mid-1940s, initiated a program of grazing reductions that caused a great deal of animosity toward the FS by local residents. Motivated largely by the hope that jobs, created by a sustained yield unit, would offset the effects of grazing reductions on local people, the FS designed and established the Vallecitos Federal Sustained Yield Unit. Under the plan developed by the FS, timber from the unit was to be cut and processed by a single designated operator who would establish a local sawmill and employ local residents. [18]

The Vallecitos National Yield Sustained area, one of only four Federal Sustained Yield Units in the country, was created in 1947 to provide "the maximum feasible, permanent support to the Vallecitos community and nearby areas".[19] With the exception of a few years, the unit's history is one of chronic conflict between local communities and the FS, frustration by local communities over their exclusion by the FS from decision-making about the unit, and the unit's failure to improve economic conditions significantly in local communities[20]. The major sawmill operations were closed in the mid 1990s.[21]

1.4.4 Questa Ranger District

Questa is a small village located 25 miles north of Taos on Highway 522 in Taos County. There are approximately 2,500 people living in the area. The Questa RD contains 278,885 acres, making it the fourth largest district in the Forest.

Recreation is a major draw to the area which offers recreational opportunities such as hunting, stream and lake fishing, rafting, camping, hiking, mountain biking, four-wheeling, motorcycling, sledding, snowshoeing, snowmobiling and cross-country skiing. In addition, the 100,000 acre Valle Vidal Unit provides big game hunting opportunities not found elsewhere in the state. The Red River Ski Area and the Taos Ski Valley, both of which operate under special-use permits are popular winter destinations.

Included in the Questa RD are two wilderness areas: the Wheeler Peak Wilderness just south of Questa and the Latir Peak Wilderness to the north. The Wheeler Peak Wilderness is 20,506 acres covering the southern tip of the RD. The United States Congress designated the Wheeler Peak Wilderness in 1960. The main attraction is Wheeler Peak (13,161 feet), the highest point in New Mexico.

The Latir Peak Wilderness is relatively unknown and less traveled. It is comprised of southern Rocky Mountain high country meadows, alpine grasslands and tundra, clear lakes, spruce-fir forest and some of New Mexico's highest peaks. The Latir Peak wilderness is the fifth-smallest New Mexico wilderness and attracts few visitors. However, four of the state's highest mountains: Venado Peak (12,734 feet), Latir Peak (12,708 feet), Latir Mesa (12,692 feet), and Virsylvia Peak (12,594 feet) are here.[22]

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[18] *Unasylva*, Issue number: 184 1996 64 pg V9122/E. http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/v9122e/v9122e10b.htm.
[19] Ibid.
[20] Wilmsen, Carl. (2001). “Sustained Yield Recast: the Politics of Sustainability in Vallecitos, New Mexico”, in *Society and Natural Resources*, 14: 193-207.
[21] Ragan, T. “Operator Dismantles Vallecitos Sawmill.” *Albuquerque Journal*. April 10, 1996.
[22] New Mexico Wilderness Alliance, “Latir Peak Wilderness.” http://www.nmwild.org/wilderness/latir.

With five peaks over 12,500 feet, the Questa RD features an abundance of alpine-tundra "high country". The alpine tundra vegetation that covers the peaks is rare in the Southwest. Most of the area is drained by the Lake Fork of Cabresto Creek that originates at Heart Lake and is impounded just outside the wilderness in Cabresto Lake, the main trailhead for those going into the wilderness. Many species of wildlife indigenous to the Hudsonian zone of the southern Rocky Mountains can be found in this remote area.

The relatively small size of the Latir Peak Wilderness area has less to do with natural history than socio-cultural history. Although the wilderness stretches from NM38 in Red River Canyon north to the Colorado border, more than half of this wild land is within the Sangre de Cristo Land Grant. In 1843, just less than one million acres were given to Mexican citizens Narciso Beaubien and Stephen Louis Lee by Mexican governor Manuel Armijo in a communal land grant. [23] This grant was among several northern New Mexico land grants that survived the somewhat turbulent transition from Mexican to American governance after 1848. The Latir Lakes are located to the north of this wilderness on the Sangre de Cristo land grant, and can be visited with the purchase of a permit.

The Questa RD is also home to the “Enchanted Circle Drive”, which is a NF Scenic Byway. The Circle is an 84 mile loop that travels through the villages of Questa, Red River, Eagle Nest, Taos, and back to Questa.

1.4.5 Camino Real Ranger District

The Camino Real RD is the southernmost district in the forest, abutting the Santa Fe NF at the southern border. The district is home to the Sangre de Cristo Mountains, a subrange of the Southern Rockies. The town of Peñasco is the district’s base of operations and is located at the base of the mountains. Peñasco is surrounded by several other small communities, which total an approximate population of 2,500. In the western part of the region lies the Picuris Pueblo; the smallest Pueblo in New Mexico. This RD is the largest of the six districts, with 334,248 acres comprising almost one third of the Carson NF. In regards to access, the Camino Real is quite far from any major airports. The Albuquerque International Sunport is 120 miles to the south, and smaller airports are located in Taos and in Santa Fe.

The small village of Peñasco is located on the southeast corner of the Picuris Pueblo Grant. According to the FS website, residents of Peñasco have employment mostly outside of the town. Many residents commute to jobs in Santa Fe or Los Alamos, both 70 miles one way, or to Taos which is 20 miles one way. The Peñasco Public Schools, the FS, and the State Highway Department are the primary employers in the area.

The Pecos Wilderness, designated in 1933, contains 223,333 acres. It is at the southern end of the Sangre de Cristo Mountains, at the headwaters of the Pecos River, about 12 miles southeast of Peñasco. From its origin, the first 13.5 miles of the Pecos River is designated "wild" in the Wild and Scenic Rivers System. Fishing, hunting and well-known scenery attracts many visitors. Truchas Peak, the second highest in New Mexico, provides a challenge for mountain climbers and ecologists who may visit to observe rare species of plants and animals. The Sipapu Ski Area is located 12 miles east of Peñasco. The resort is quite small, operating under a special-use permit

[23] The Center for Land Grant Studies, http://www.southwestbooks.org/grants_taos.htm.

on the district. Many lakes, more than 150 miles of streams and a 100-foot waterfall, provide opportunities for anglers.[24] An extensive trail system (250 miles) promises space for horseback and mountain bike riding.

While portions of the Pecos Wilderness receive very heavy use, 85 percent of hikers use 15 percent of the wilderness; other areas receive very few visitors. The most frequently traveled trails are those leading to Beatty's Cabin, Puerto Nambe, Hermits Peak, the high peaks, the lake basins, and even Pecos Falls. But after Labor Day, visits to these areas decline precipitously.[25] The wilderness area is a major draw for recreational purposes, but it has a long history of over-grazing and decimated wildlife.

For centuries, the Pecos high country had been a resource for Native American peoples, a place to hunt, fish, cut fuelwood and timber, and gather medicinal and edible plants. On the west lived Tewa and Keresan Pueblo peoples; on the north lived Tiwa Pueblos and nomadic mountain peoples such as the Utes; on the east Plains Indians roamed; and on the south Towa Indians inhabited the pueblo the Spaniards called Pecos, from a Keresan word meaning "place where there is water."[26]

Spaniards arrived in 1540 and established villages around the perimeter of what is now the wilderness area. Grazing livestock became common as early as 1825, but its impact on the land was relatively small. That changed, however, when English-speaking settlers arrived after the United States annexed New Mexico from Mexico in 1846, bringing with them vastly more powerful agricultural technologies. With the new government also came the philosophy that emphasized market economics over subsistence economics. Growing commercial interests in the land cost the existing ecosystems dearly.[27]

The wilderness area was not able to sustain its wildlife after more and more people began accessing the area. By 1888, elk had been exterminated in what is now the Pecos Wilderness. By 1900, they were gone from the rest of the state. Rocky Mountain bighorn sheep had disappeared by 1900. The last Grizzly Bear in the Pecos Wilderness was killed in 1923. Perhaps the most telling example of the wildlife devastation is that during the 1915 hunting season, on the one million acres of the Carson NF (including the Pecos Wilderness), only eight deer were taken.[28]

In 1892 President Harrison proclaimed the upper Pecos watershed a timberland reserve for watershed protection (a proclamation not implemented until 1898). The area was withdrawn from every use including logging, grazing, and mining, and it was closed completely to the public. The Pecos Primitive Area of 133,640 acres was established by the Chief of the Forest Service in 1933. It was declared a FS Wilderness in 1955 and became part of the National Wilderness Preservation System on September 3, 1964, when President Johnson signed the Wilderness Act. In 1980, the New Mexico Wilderness Act added 55,000 acres to include more lands with wilderness character.

[24] GORP, "Pecos Wilderness," http://gorp.away.com/gorp/resource/us_wilderness_area/nm_pecos.htm.
[25] New Mexico Wilderness Alliance, "Pecos Wilderness," http://www.nmwild.org/wilderness/pecos.
[26] Ibid.
[27] USDA Forest Service, Timeless Heritage: A History of the Forest Service in the Southwest. 1988.
[28] Ibid.

1.4.6 Jicarilla Ranger District

The Jicarilla RD is located in the northwest portion of New Mexico within the San Juan Basin, about 50 miles east of Farmington. This RD is somewhat isolated from the other five, as it is separated by the large expanse of the Jicarilla Apache Indian Reservation. This district covers over 159,000 acres of land, including about 6,000 acres of privately owned land. The district was incorporated into the National Forest system in 1910. During the 1940s and 1950s, exploration for oil and gas began in the San Juan Basin, creating a very lucrative gas industry.[29] Today, natural gas production is the prevalent land use in the district, as 98 percent of the district is leased out for mineral development.

With over 600 gas wells in production, the district supplies about seven percent of the nation's daily natural gas supply.[30] The district features hundreds of miles of associated access roads, pipelines and compressors. Most of the leases began between 1950 and 1970, before the National Environmental Protection Act (NEPA) of 1969, when environmental restrictions were not as rigorous.

In 2002, there was controversy over a proposal considering opening an additional 2,500 acres for natural gas drilling.[31] With the ever-rising price of gas and oil, energy companies are clamoring to lease new land and drill new wells. However, the 2004 Land Use Plan was withdrawn after the plan was criticized for restricting activity on wells that were already producing. Environmental conservation groups are voicing concerns regarding the effects on wildlife and habitats in the area.

The Jicarilla RD is home to an estimated 220 wild horses, which are believed to be descendants of escaped or released horses belonging to the Spanish explorers, ranchers, miners, US Calvary and Native Americans.[32] The Wild Free-Roaming Horses and Burros Act of 1970 gave the BLM and FS the authority to manage, protect and control wild horses on public lands. Federal protection and the absence of natural predators have caused a steady increase in the wild horse population. FS officials capture the horses periodically (when vegetation and water become scarce) and offer them up for adoption.[33] There have been more than 178,000 wild horses and burros placed into private care between 1973 and 2005.[34]

The nearest airport to the district is in Farmington, NM about 20 miles west. The airport has daily commuter flights to Santa Fe, Albuquerque and other New Mexico cities. The nearest city is Bloomfield (about 40 miles away), which can be accessed from the south via US550; east and west via US64 and from the north via 544.

[29] Federal Register, Vol. 69 No. 193, October 6, 2004 Notices.
[30] Rankin, A. "Environmental Group to Fight Drill Plan," *Albuquerque Journal,* November 8 2004.
[31] Rankin, A, "Forest Plan Withdrawn After Protests," *Albuquerque Journal*, October 18, 2004.
[32] Bureau of Land Management, "Wild Horse and Burro Program," http://www.wildhorseandburro.blm.gov/index.php.
[33] The Associated Press, "Carson Forest Plans Wild Horse Adoption This Month," January 11, 2006.
[34] Bureau of Land Management, "Wild Horse and Burro Program," http://www.wildhorseandburro.blm.gov/index.php.

1.5 Organization of the Report

The organization of this assessment is based on the collection and analysis of data pertinent to seven individual assessment topics. Chapter 2 provides information on demographic trends and economic characteristics of the counties within the assessment area. Chapter 3 discusses the access and travel patterns within the area. Chapter 4 examines the forest's land cover and uses, including descriptions of historical conveyances and exchanges, invasive species, fire and fuels. Chapter 5 describes land uses and the forest's various users. Chapter 6 examines special management areas in the forest including recreational sites and inventoried roadless areas. Chapter 7 provides an assessment of the economic impacts the Carson NF has on surrounding communities. Chapter 8 explores relationships between the Carson NF and various communities at the local and regional levels. Finally, Chapter 9 provides a summary of principal findings and opportunities for the FS.

2 Demographic and Socioeconomic Trends

This chapter describes the demographic and socioeconomic characteristics of the population of the Carson NF assessment area. Historic data about the social and economic status of those in the area of assessment are provided here. Data are presented primarily at the county level for the New Mexico counties (Colfax, Mora, Rio Arriba, Taos) that contain the Carson NF.

2.1 Population Growth

Table 2.1 shows that population density is relatively sparse in the assessment area, as Taos County, the county with the highest density, measures 13.6 persons per square mile. By comparison, the population density for the entire United States (50 states and the District of Columbia) is about 79 persons per square mile.

Table 2.1: 2000 Population Density (sq. mile)

	Population Density
Colfax	3.8
Mora	2.7
Rio Arriba	7.0
Taos	13.6

Source: US Census Bureau, 2000 Decennial Census.

Note: Population Density calculated as per square mile of land area.

Table 2.2 shows that between 1980 and 2000 the population grew moderately in the assessment area. The population increased 36 percent over the two decades, from 66,610 to 91,538, an increase of just below 24,000 persons.

In 2000, just under half of the population in the area resided in Rio Arriba County, about one-third in Taos County and the remainder in Mora and Colfax Counties. Of the four counties, Taos County grew the fastest (54%) during 1980-2000, with the growth rate higher in the 1990's over the 1980's. Taos County added about 10,500 and Rio Arriba County about 12,000 residents during the two decades. Research has shown that affluent individuals who made their living elsewhere, attracted by recreational amenities; have been relocating in and around mountain communities in the assessment area and throughout the West[35]. Colfax County added about 500 new residents during the 20-year period, as growth dipped in the 1980's but picked up in the 1990's. Mora County's growth was flat during the 1980's yet matched the area's growth rate in the 1990's.

According to UNM-BBER projections, 118,000 residents will live in the assessment area by 2030, an increase of 16,000 people between 2000 and 2030. The area's population is expected to grow 30 percent, at about two-thirds that of New Mexico, over the 30-year period. After 2000 growth is expected to taper with this trend affecting all four counties. Population growth rates will be higher in Mora and Taos counties during 2000-2030, similar to or slightly above the state's growth rates, and lower in Rio Arriba and Colfax Counties.

[35] Cromartie, J. and Wardwell, J. (2000). "Migrants Settling Far and Wide in the Rural West." *Rural Development Perspectives*. 14(2):7.

Table 2.2: Historical & Projected County Population, 1980-2030

	Historical			Projected		
	1980	**1990**	**2000**	**2010**	**2020**	**2030**
Colfax	13,667	12,925	14,189	15,234	15,890	16,026
Mora	4,205	4,264	5,180	6,205	7,137	7,862
Rio Arriba	29,282	34,365	41,190	45,058	48,630	50,996
Taos	19,456	23,118	29,979	35,097	39,442	42,678
TOTAL CARSON COUNTIES	**66,610**	**74,672**	**90,538**	**101,594**	**111,099**	**117,562**
TOTAL NM	1,303,303	1,515,069	1,819,046	2,112,986	2,383,116	2,626,553

	Percent Change				
	1980-1990	**1990-2000**	**2000-2010**	**2010-2020**	**2020-2030**
Colfax	-5%	10%	7%	4%	1%
Mora	1%	21%	20%	15%	10%
Rio Arriba	17%	20%	9%	8%	5%
Taos	19%	30%	17%	12%	8%
TOTAL CARSON COUNTIES	**12%**	**21%**	**12%**	**9%**	**6%**
TOTAL NM	16%	20%	16%	13%	10%

Source: US Census Bureau, Decennial Census, 1980, 1990, 2000. Calculations done by UNM - BBER.

Table 2.3 displays the population for several larger incorporated communities in the assessment area. Refer to Appendix Table 1 for a complete list of communities with their populations that meet the criteria to be Census Designated Places (CDP's).

Table 2.3: Population of Places, 1980-2000

		Number			Percent Change	
Carson Places	**County**	**1980**	**1990**	**2000**	**1980-1990**	**1990-2000**
Angel Fire village	Taos	NA	93	1,048	NA	1027%
Chama village	Rio Arriba	1,090	1,048	1,199	-4%	14%
Chimayo CDP	Taos	1,993	2,789	2,924	40%	5%
Dulce CDP	Rio Arriba	1,648	2,438	2,623	48%	8%
Espanola city	Rio Arriba	6,803	8,389	9,688	23%	15%
La Puebla CDP	Rio Arriba	NA	NA	1,296	NA	NA
Questa village	Taos	1,202	1,707	1,864	42%	9%
Ranchos de Taos CDP	Taos	1,411	1,779	2,390	26%	34%
Raton city	Colfax	8,225	7,372	7,282	-10%	-1%
Springer town	Colfax	1,657	1,262	1,285	-24%	2%
Taos town	Taos	3,369	4,065	4,700	21%	16%
Taos Pueblo CDP	Taos	NA	1,187	1,264	NA	6%
TOTAL CARSON PLACES		**29,552**	**39,681**	**44,575**	34%	12%

Source: US Census Bureau, Decennial Census, 1980, 1990, 2000. Calculations done by UNM - BBER.
Note: Total includes all places, some of which are not shown in this table.

2.2 Racial/Ethnic Composition

New Mexico was the first state in the United States with a total minority population exceeding that of the White Non-Hispanic population. **Table 2.4** shows that the population increased for all race/ethnic groups in the assessment area between 1990 and 2000. Also, the population increased for most race/ethnic groups in the four counties. The interesting exception is Rio Arriba County, where the number who self-identified as White fell by 1,000, while the "other" race category added over 7,000. Although not shown in the table, White Non-Hispanics increased in all four counties, adding about 6,000 people overall, with Taos County accounting for about 3,700 of this gain. While the White population thus increased in Taos County, the group's share of the county total dropped. Taos County had a very large increase – over 4,000 – in the number of people who self-reported as "other" when asked about racial identity. This "other" includes individuals who self-identify with more than one racial group, but it also includes those, fairly numerous in New Mexico, who self-identify with some racial group not listed. Many of those who so identify are Hispanics.

Between 1990 and 2000, Mora County's population increased by 900, with Whites accounting for over 600 and the "other" race category for about 250 of the increase. The ethnic split showed Hispanics with two-thirds and Non-Hispanics with one-third of the increase. In Colfax County the population grew by over 1,200, as Whites added over 850 and the "other" race category added over 250. By ethnic group, Hispanics gained about 550 and Non-Hispanics about 650.

Table 2.5 presents the percentages of the race-ethnic groups represented in each county in the assessment area. About two-thirds of the population in the assessment area identified themselves as Hispanic in 1990 versus 38 percent for New Mexico as a whole. Between 1990 and 2000, the Hispanic share of the total population in New Mexico rose from 38 percent to 42 percent. In the assessment counties, however, their share slipped from 67 percent to 65 percent. Hispanics maintained their share of the total population in Colfax County and Rio Arriba County, but lost ground in both Taos County, where, despite growing by over 5,000 people, the Hispanic share fell from 65 percent to 58 percent, and largely Hispanic Mora County, where an influx of Non-Hispanic Whites brought the share down to 83 percent from 85 percent. The White Non-Hispanic share of the total population increased from 24 percent to 27 percent between 1990 and 2000.

American Indians increased as a percent of the New Mexico population between 1990 and 2000. During the same period, the American Indian population in the assessment counties fell by one percentage point and in Rio Arriba County fell from 14 percent to 12 percent despite a population gain of nearly 200 people. Rio Arriba County has the largest American Indian population, with the Jicarilla Apache Reservation and several pueblos located within the county's borders. Despite the increase in White Non-Hispanics in Taos County between 1990 and 2000, American Indians, largely members of Taos Pueblo, retained a stable six percent share of the county total.

As indicated above, population trends for race and ethnicity varied by county. Colfax County had a 52 percent non-Hispanic to 48 percent Hispanic split in 1990 with little change over the decade, while the Hispanic population in Rio Arriba County held at 74 percent. By contrast, the influx of White Non Hispanics into both Taos and Mora counties increased the Non-Hispanic share, respectively, from 35 percent to 42 percent in Taos County and from 15 percent to 18 percent in Mora County. These shifting demographics, particularly in Taos and Mora counties, have social and political implications that will inevitably affect interactions between the Carson NF and the surrounding communities.

Table 2.4: Race / Ethnicity by County, 1990 & 2000

	Ethnicity		Race					Total
	Non-Hispanic	Hispanic	White	African American	American Indian	Asian Pacific Islander	Other	
Year 1990								
Colfax	6,682	6,190	10,697	29	65	15	2,066	12,872
Mora	630	3,623	2,423	2	12	1	1,815	4,253
Rio Arriba	8,976	24,955	24,323	117	4,830	40	4,621	33,931
Taos	7,979	15,008	16,868	46	1,473	70	4,530	22,987
Total Carson Counties	**24,267**	**49,776**	**54,311**	**194**	**6,380**	**126**	**13,032**	**74,043**
Year 2000								
Colfax	7,346	6,739	11,564	41	109	46	2,325	14,085
Mora	931	4,229	3,050	5	43	2	2,060	5,160
Rio Arriba	10,361	30,025	23,320	85	5,002	72	11,907	40,386
Taos	12,337	17,370	19,118	81	1,768	108	8,632	29,707
Total Carson Counties	**30,975**	**58,363**	**57,052**	**212**	**6,922**	**228**	**24,924**	**89,338**

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM - BBER.
Note: Ethnicity can be of any race. The "Other" group includes two or more races.

Table 2.5: Race / Ethnicity by County, Percentage, 1990 & 2000

	Ethnicity		Race					Total
	Non-Hispanic	Hispanic	White	African American	American Indian	Asian Pacific Islander	Other	
Year 1990								
Colfax	52%	48%	83%	0%	1%	0%	16%	100%
Mora	15%	85%	57%	0%	0%	0%	43%	100%
Rio Arriba	26%	74%	72%	0%	14%	0%	14%	100%
Taos	35%	65%	73%	0%	6%	0%	20%	100%
Total Carson Counties	33%	67%	73%	0%	9%	0%	18%	100%
New Mexico	62%	38%	76%	2%	9%	1%	13%	100%
Year 2000								
Colfax	52%	48%	82%	0%	1%	0%	17%	100%
Mora	18%	82%	59%	0%	1%	0%	40%	100%
Rio Arriba	26%	74%	58%	0%	12%	0%	29%	100%
Taos	42%	58%	64%	0%	6%	0%	29%	100%
Total Carson Counties	35%	65%	64%	0%	8%	0%	28%	100%
New Mexico	58%	42%	67%	2%	10%	1%	21%	100%

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM - BBER.
Note: Ethnicity can be of any race. The "Other" group includes two or more races.

2.3 Age of Population

Table 2.6 presents the age of the population by county in the assessment area. Shown are the percentages of those within each cohort as derived from the 1990 and 2000 censuses and followed by projections of each age cohort in 10-year increments until 2030. Corresponding with the national trend, there will be growth in all counties in the population aged 65 and older.

Table 2.6: Age Distribution by County, 1990-2030

		Percent Distribution				
		Actual		Projections		
County	Age	1990	2000	2010	2020	2030
Colfax	0 - 14	22.8	19.7	17.5	17.3	15.8
	15 - 64	60.9	63.4	61.3	54.9	50.2
	65 yrs. & over	16.3	16.9	21.2	27.8	34.0
Mora	0 - 14	24.6	20.6	16.0	16.0	12.7
	15 - 64	60.4	64.0	63.8	63.8	53.8
	65 yrs. & over	15.0	15.4	20.2	20.2	33.5
Rio Arriba	0 - 14	27.4	23.8	20.7	20.9	19.4
	15 - 64	63.0	65.3	66.8	62.6	60.5
	65 yrs. & over	9.6	10.9	12.4	16.5	20.1
Taos	0 - 14	24.6	19.9	16.3	15.8	14.6
	15 - 64	64.5	67.7	66.3	58.9	55.0
	65 yrs. & over	10.9	12.3	17.3	25.4	30.4
Total Carson Counties	0 - 14	25.6	21.7	18.4	18.2	16.7
	15 - 64	62.9	65.7	65.6	59.9	56.6
	65 yrs. & over	11.5	12.6	15.9	21.9	26.6
NEW MEXICO	0 - 14	25.1	23.0	20.0	19.2	17.9
	15 - 64	64.2	65.3	66.1	62.6	59.7
	65 yrs. & over	10.7	11.7	13.9	18.2	22.4

Source: New Mexico County Population Projections: July 1, 2000 to July 1, 2030; UNM-BBER, April 2004.

The 15 to 64 aged cohort represents those of working age, but its share is expected to shrink from 63 percent to 57 percent between 1990 and 2030. All counties will experience the trend of fewer working age people, although the shrinkage will be less in younger Rio Arriba County. These are counties with modest populations and less economic activity than urban centers in the state. With limited opportunities for employment, younger people migrate to larger communities with more diversified economic bases. For example, in Rio Arriba County, proximity to Santa Fe allows for commuting for educational and employment opportunities.

The 65 and older cohort will double its share, rising from 11.5 percent to 27 percent, in the assessment area during the 40-year period. This cohort's share will more than double to about one-third of the population in three counties, except Rio Arriba County. Aging populations will present new challenges for governments as those retiring from the workforce expect to receive services funded by revenues from a workforce that is a shrinking portion of the total population. These retirees will draw on federal and state resources as they seek services such as Medicaid and Social Security. The consequence for Federal agencies like the FS may be increased competition for funding in an era of flat or declining government revenues.

2.4 Income and Poverty

Table 2.7 depicts per capita income in 1999 dollars by county in the assessment area in 1989 and 1999. Real per capita income increased in all counties during the ten-year period. The income gap between the assessment area (and for each county) and New Mexico narrowed over the ten years. For the assessment area, real per capita income grew by nearly $4,000, rising from $11,158 to $15,100, which exceeded the approximate $2,700 gain for New Mexico. Compared to the state average, in both 1989 and 1999 real per capita income was higher in Colfax County and Taos County while it was lower in Mora County and Rio Arriba County. In 1999 real per capita income ranged from $12,340 in Mora County to $16,418 in Colfax County.

Several changes in resource industries in northern New Mexico have decreased the levels of economic activity. The reductions of operations and virtual closing of coal mining in Raton in Colfax County and molybdenum mining in Taos County affected per capita income growth and levels. Moreover, sawmill closures around Española contributed to economic difficulties in the 1990's. [36]

Table 2.7 also shows the number and percent of persons living below the federal poverty level for each county. While real per capita incomes grew, poverty rates dropped. In all counties, except Colfax County, poverty rates were above the New Mexico average of 18.4 percent in 1999. About 17,900 persons lived in poverty in the assessment area in 1999, declining by about 1,700 persons from 1989. For the assessment area, the poverty rate dropped 6.5 percentage points, compared to 2 percentage points for the state. Poverty rates fell in all counties but dropped an impressive 11 percentage points in Mora County.

Table 2.7: Per Capita Income and Persons in Poverty, 1990 & 2000

	1989			1999		
	Per Capita Income	Persons Below Poverty	Percent of Persons Below Poverty	Per Capita Income	Persons Below Poverty	Percent of Persons Below Poverty
Colfax	13,077	2,321	18.6%	16,418	2,039	14.8%
Mora	9,112	1,540	36.2%	12,340	1,305	25.4%
Rio Arriba	10,200	9,372	27.5%	14,263	8,303	20.3%
Taos	11,886	6,335	27.4%	16,103	6,232	20.9%
CARSON NF COUNTIES	**11,158**	**19,568**	**26.5%**	**15,100**	**17,879**	**20.0%**
NEW MEXICO	14,596	305,934	20.6%	17,261	328,933	18.4%

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations by UNM BBER.

Note: The poverty line is the federal established poverty level. Per capita income is in 1999 dollars.

Per Capita income figures are adjusted for inflation and are reported in real 1999 Dollars.

Poverty in the assessment area is high (20%) and generally tracks with race and ethnicity. **Table 2.8** indicates that poverty percentages by race in the assessment area are: Whites (18%), African Americans (22%), American Indians (29%), Asians and Pacific Islanders (35%), and "Other"

[36] Ragan, T. "Operator Dismantles Vallecitos Sawmill." *Albuquerque Journal*. April 10, 1996.

(21%). In Rio Arriba County the poverty rate is extremely high for American Indians (70%) and Whites (44%). In Taos County over one-third of Whites are in poverty and the rate is fairly high for American Indians (29%). The "Other" group also has a high rate of poverty in these two counties.

In the assessment area the poverty rate differs slightly by ethnicity for Non-Hispanics (19%) and Hispanics (21%). In comparison, poverty rates in New Mexico are relatively lower for Non-Hispanics and a little higher for Hispanics. Hispanics are more likely than Non-Hispanics to live in poverty in Mora and Rio Arriba Counties, while the converse is the case in Taos County. In Colfax County both ethnic groups are equally like to live in poverty. Not shown in the table is the 15% poverty rate for White Non-Hispanics in the assessment area. And in Taos County just over half of White Non-Hispanics are in poverty.

Table 2.8: Poverty by Race and Ethnicity, 2000

	Race Group					Ethnicity		
	WHITE	AFRICAN AMERICAN	AMERICAN INDIAN	ASIAN & PACIFIC ISLANDER	OTHER	NON-HISPANIC	HISPANIC	TOTAL
Colfax	1,466	20	17	14	522	659	1,380	2,039
Mora	605	0	20	0	680	265	1,040	1,305
Rio Arriba	4,530	39	1,550	19	2,165	2,270	6,033	8,303
Taos	3,653	4	639	35	1,901	2,604	3,628	6,232
TOTAL CARSON COUNTIES	**10,254**	**63**	**2,226**	**68**	**5,268**	**5,798**	**12,081**	**17,879**
Percent of Total Group								
Colfax	14%	32%	1%	21%	10%	11%	11%	100%
Mora	6%	0%	1%	0%	13%	5%	9%	100%
Rio Arriba	44%	62%	70%	28%	41%	39%	50%	100%
Taos	36%	6%	29%	51%	36%	45%	30%	100%
TOTAL CARSON COUNTIES	**18%**	**22%**	**29%**	**35%**	**21%**	**19%**	**21%**	100%

Source: US Census Bureau, Decennial Census, 2000. Calculations done by UNM - BBER.
Note: Ethnicity can be of any race. The "Other" group includes two or more races.
The poverty line is the federal established poverty level. Per capita income is in 1990 dollars.

2.5 Household Composition

Table **2.9** presents household composition by type of household for 1990 and 2000. Households in the assessment area are exhibiting the same trend as seen in the US, as there are proportionally more single households and female-headed households. Total households in the area grew about 9,000, numbering about 35,500 in 2000**.**

Single households are non-family households headed by a single person. Female-headed family households are households that are headed by a female with children or other dependents and no husband is present. For example, in 2000 Mora County has 1,516 total households, of which 360 (24%) are single households and 212 (14%) are female-headed family households.

Female-headed family households increased nearly 1,250, totaling about 4,700 in 2000. The percent of female-headed households in the assessment area (13%) matches the state (13%) in 2000. The increased share of female-headed households is similar for all counties between 1990

and 2000. Female-headed households are an increasingly significant aspect of the national demographic landscape.

Similarly, households of people who live by themselves have become increasingly common. Single households continue to grow in part because of a trend in marrying at later ages. Roughly one-third of the residents in single person households in the state are over 65 years of age. In the assessment area, single households increased 3,700, totaling nearly 9,800 in 2000. In 2000 the percent of single households in the assessment area (27%) was slightly higher than in the state (25%). Single households increased by 4 percentage points in the assessment area and increased by more in Taos County, where single households constituted nearly one-third of households in 2000.

Table 2.9: Type of Household, 1990 & 2000

	Number of Households			Percent of Total Households	
	Total	Single	Female Headed, Family	Single	Female Headed, Family
Year 1990					
Colfax	4,961	1,251	490	25%	10%
Mora	1,516	360	212	24%	14%
Rio Arriba	11,525	2,254	1,636	20%	14%
Taos	8,811	2,210	1,155	25%	13%
TOTAL CARSON COUNTIES	**26,813**	**6,075**	**3,493**	**23%**	**13%**
Year 2000					
Colfax	5,799	1,606	593	28%	10%
Mora	2,015	543	271	27%	13%
Rio Arriba	15,015	3,545	2,248	24%	15%
Taos	12,701	4,066	1,631	32%	13%
TOTAL CARSON COUNTIES	**35,530**	**9,760**	**4,743**	**27%**	**13%**

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM-BBER.

Note: Single households are non-family households headed by a single person. Female headed family households include children.

2.6 Educational Attainment

Table 2.10 presents educational attainment for the 25-year and older population in 1990 and 2000. Attainment levels in 2000 have generally advanced when compared to a decade earlier as the share of the population with at least some college or with a college degree increased while those with high school or less declined. **Table 2.11** shows the share of the population in the assessment area with at least some college education increased from 37 percent to 46 percent and this improvement in the assessment area outpaced that of New Mexico. All counties have substantial decreases in the percent of adults without a high school degree or equivalent and the gap narrowed versus the state. Between 1990 and 2000 the average for the assessment area improved from 31 percent to 24 percent compared to 25 percent to 21 percent for the state. Adults in Mora and Rio Arriba counties were more likely to have lower educational levels. In Mora

County this is because of its higher proportion of elderly. The proportion of those with at least some college varied by county in 2000, ranging from Mora County (38%) to Taos County (53%), the latter being similar to the state.

Educational attainment is closely tied to one's ability to generate income. As educational attainment increases, the likelihood of poverty decreases. This assumption does not hold up as consistently in the assessment area, for while it holds for Colfax County and Rio Arriba County, it does not for both Taos County and Mora County. Taos County has relatively high poverty rates and high educational levels. The county also has a high proportion of single households as previously stated. There appears to be a sharp divide among residents of Taos County between the well off and the struggling. On the other side, Mora County has both relatively low poverty rates and low educational levels.

Table 2.10: Educational Attainment by County

	Less than 9th Grade	9th to 12th Grade	HS Grad or GED	Some College; No Degree	Assoc., BA. Or More	Total
Year 1990						
Colfax	1,036	1,371	2,820	1,494	1,608	8,329
Mora	559	512	866	296	422	2,655
Rio Arriba	3,412	3,409	6,550	3,470	3,173	20,014
Taos	1,982	2,146	4,338	2,780	3,384	14,630
TOTAL CARSON COUNTIES	**6,989**	**7,438**	**14,574**	**8,040**	**8,587**	**45,628**
Year 2000						
Colfax	596	1,232	3,258	2,092	2,340	9,518
Mora	481	530	1,061	602	674	3,348
Rio Arriba	3,030	3,971	8,110	5,271	5,548	25,930
Taos	1,532	2,752	5,462	4,420	6,360	20,526
TOTAL CARSON COUNTIES	**5,639**	**8,485**	**17,891**	**12,385**	**14,922**	**59,322**

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM-BBER.

Table 2.11: Educational Attainment Percentage by County

	Less than 9th Grade	9th to 12th Grade	HS Grad or GED	Some College; No Degree	Assoc., BA. Or More	Total
Year 1990						
Colfax	12%	16%	34%	18%	19%	100%
Mora	21%	19%	33%	11%	16%	100%
Rio Arriba	17%	17%	33%	17%	16%	100%
Taos	14%	15%	30%	19%	23%	100%
TOTAL CARSON COUNTIES	**15%**	**16%**	**32%**	**18%**	**19%**	**100%**
TOTAL NM	11%	14%	29%	21%	25%	100%
Year 2000						
Colfax	6%	13%	34%	22%	25%	100%
Mora	14%	16%	32%	18%	20%	100%
Rio Arriba	12%	15%	31%	20%	21%	100%
Taos	7%	13%	27%	22%	31%	100%
TOTAL CARSON COUNTIES	**10%**	**14%**	**30%**	**21%**	**25%**	**100%**
TOTAL NM	9%	12%	27%	23%	29%	100%

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM-BBER.

2.7 Housing

Table 2.12 illustrates the number of housing units and the occupied status of these units in each county in the assessment area. As would be expected, the number of dwellings in all counties increased as the population grew.

Table 2.12: Housing Units and Occupation of Housing

	1990			2000		
	Housing Units: Total	Housing Units: Occupied	Housing Units: Vacant	Housing Units: Total	Housing Units: Occupied	Housing Units: Vacant
Colfax	8,265	4,959	3,306	8,959	5,821	3,138
Mora	2,486	1,519	967	2,973	2,017	956
Rio Arriba	14,357	11,461	2,896	18,016	15,044	2,972
Taos	12,020	8,752	3,268	17,404	12,675	4,729
TOTAL CARSON COUNTIES	**37,128**	**26,691**	**10,437**	**47,352**	**35,557**	**11,795**

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM-BBER.

The housing stock expanded by over 10,000 units during 1990-2000, increasing by about one-quarter in the assessment area. Table 2.12 shows that one in four houses is vacant in the assessment area and each county has a high proportion of vacant housing. The reason for this becomes clearer in Table 2.13 and Table 2.14 that shows that in 2000, 57 percent of total vacant

homes are for seasonal or recreational use within the assessment area. In Colfax County and Taos County, seasonal or recreation use accounts for 72 percent and 63 percent of the vacant housing, respectively. Taos County particularly and Rio Arriba County to a lesser extent gained a large number of vacant houses for seasonal or recreational use.

Table 2.13: Vacant Housing by Type Of Vacancy

	For rent	For sale only	Rented or sold, not occupied	Seasonal or rec use	For migrant workers	Other vacant	Total vacant
Year 1990							
Colfax	391	106	97	2,220	0	492	3,306
Mora	7	36	305	348	3	268	967
Rio Arriba	326	128	200	658	7	1,577	2,896
Taos	373	137	210	1,127	7	1,414	3,268
TOTAL CARSON COUNTIES	**1,097**	**407**	**812**	**4,353**	**17**	**3,751**	**10,437**
Year 2000							
Colfax	248	168	93	2,264	6	359	3,138
Mora	19	15	82	428	1	411	956
Rio Arriba	239	151	133	1,042	1	1,406	2,972
Taos	593	164	163	2,968	5	836	4,729
TOTAL CARSON COUNTIES	**1,099**	**498**	**471**	**6,702**	**13**	**3,012**	**11,795**

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations done by UNM-BBER.

Table 2.14: Percent of Total Vacant Housing

	For rent	For sale only	Rented or sold, not occupied	Seasonal or rec use	For migrant workers	Other vacant	Total vacant
Year 1990							
Colfax	12%	3%	3%	67%	0%	15%	100%
Mora	1%	4%	32%	36%	0%	28%	100%
Rio Arriba	11%	4%	7%	23%	0%	54%	100%
Taos	11%	4%	6%	34%	0%	43%	100%
TOTAL CARSON COUNTIES	**11%**	**4%**	**8%**	**42%**	**0%**	**36%**	**100%**
Year 2000							
Colfax	8%	5%	3%	72%	0%	11%	100%
Mora	2%	2%	9%	45%	0%	43%	100%
Rio Arriba	8%	5%	4%	35%	0%	47%	100%
Taos	13%	3%	3%	63%	0%	18%	100%
TOTAL CARSON COUNTIES	**9%**	**4%**	**4%**	**57%**	**0%**	**26%**	**100%**

Source: 2000 US Census Bureau, Decennial Census, 1990 and 2000. Calculations by UNM-BBER.

As demonstrated in **Table 2.15**, the housing stock in the assessment area is about 32 years old in 2000. Taos and Rio Arriba Counties feature a younger housing stock and Mora and Colfax

counties an older housing stock. Also shown is the percentage of households that lack complete plumbing. There is usually a correlation between counties of high poverty (Table 2.5) and the lack of plumbing in a dwelling. In Mora County, 12 percent of the housing stock in 2000 lacked complete plumbing and the proportion increased from 1990. The other three counties, however, had no increase in the percent of houses without plumbing. In contrast, the state's average age of housing rose from 22 to 27 years and the proportion of households without plumbing stayed level at 3 percent. In the assessment area, housing that lacked plumbing facilities increased by 532 units between 1990 and 2000 but the proportion remained at 6 percent.

Table 2.15: Age of Housing Stock and Plumbing Availability

	Average Age of Housing Stock		Lacking Complete Plumbing Facities	
	1990	**2000**	**1990**	**2000**
Colfax	34.8	34.1	1%	1%
Mora	37.9	37.8	9%	12%
Rio Arriba	26.2	28.8	7%	6%
Taos	28.4	28.3	8%	7%
TOTAL CARSON COUNTIES	**31.8**	**32.3**	**6%**	**6%**
TOTAL NM	22.2	27.0	3%	3%

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations by UNM BBER.

2.8 Net Migration

Table **2.16** illustrates the net migration into the assessment area at the county level. In each decennial Census, respondents are asked about their county and state of residence five years earlier; these data include only those 5 years of age or older. For the assessment area in 2000, 33 percent of those in the area had changed addresses in the past five years. Of these 28,457, 13,479 had moved from a house in the county of residence to another house within the same county. There has been a substantial increase in movers from other states from a decade earlier, as 7,778 persons, or more than one of four movers, came to the area from other states in 2000. This compares to 5,117 or one of five movers from other states in 1990. And of those who moved from other states, the region of origin in 2000 (as a percent of the total) was Northeast (1%), Midwest (2%), South (3%), and West (5%) -- (Texas is in the South region and California dominates the West region). There was little difference in these percentages between the 1990 and 2000 census.

Table 2.16: Net Migration by County

	COLFAX COUNTY				MORA COUNTY			
	1990	2000	Percent of Total 1990	Percent of Total 2000	1990	2000	Percent of Total 1990	Percent of Total 2000
TOTAL	12,020	13,423	100%	100%	3,988	4,857	100%	100%
Same House	6,639	7,566	55%	56%	2,750	3,364	69%	69%
Different House	5,381	5,857	45%	44%	1,238	1,493	31%	31%
in the United States	5,374	5,700	45%	42%	1,238	1,470	31%	30%
Same County	3,083	2,829	26%	21%	606	482	15%	10%
Different County	2,291	2,871	19%	21%	632	988	16%	20%
Same State	912	1,088	8%	8%	387	601	10%	12%
Different State	1,379	1,783	11%	13%	245	387	6%	8%
Northeast	42	98	0%	1%	12	5	0%	0%
Midwest	182	197	2%	1%	21	29	1%	1%
South	526	555	4%	4%	107	105	3%	2%
West	629	933	5%	7%	105	248	3%	5%
Puerto Rico	0	0	0%	0%	0	0	0%	0%
Elsewhere	7	157	0%	1%	0	23	0%	0%

	RIO ARRIBA COUNTY				TAOS COUNTY			
	1990	2000	Percent of Total 1990	Percent of Total 2000	1990	2000	Percent of Total 1990	Percent of Total 2000
TOTAL	31,229	38,419	100%	100%	21,328	28,347	100%	100%
Same House	20,770	27,410	67%	71%	13,113	18,249	61%	64%
Different House	10,459	11,009	33%	29%	8,215	10,098	39%	36%
in the United States	10,337	10,487	33%	27%	8,058	9,706	38%	34%
Same County	6,768	5,500	22%	14%	4,951	4,668	23%	16%
Different County	3,569	4,987	11%	13%	3,107	5,038	15%	18%
Same State	2,096	3,015	7%	8%	1,087	1,402	5%	5%
Different State	1,473	1,972	5%	5%	2,020	3,636	9%	13%
Northeast	107	139	0%	0%	174	362	1%	1%
Midwest	168	204	1%	1%	132	331	1%	1%
South	347	493	1%	1%	618	981	3%	3%
West	851	1,136	3%	3%	1,096	1,962	5%	7%
Puerto Rico	0	8	0%	0%	10	12	0%	0%
Elsewhere	122	514	0%	1%	147	380	1%	1%

	NEW MEXICO				TOTAL CARSON COUNTIES			
	1990	2000	Percent of Total 1990	Percent of Total 2000	1990	2000	Percent of Total 1990	Percent of Total 2000
TOTAL	1,390,048	1,689,911	100%	100%	68,565	85,046	100%	100%
Same House	719,628	919,717	52%	54%	43,272	56,589	63%	67%
Different House	670,420	770,194	48%	46%	25,293	28,457	37%	33%
in the United States	645,519	731,488	46%	43%	25,007	27,363	36%	32%
Same County	345,469	400,128	25%	24%	15,408	13,479	22%	16%
Different County	300,050	331,360	22%	20%	9,599	13,884	14%	16%
Same State	107,289	126,093	8%	7%	4,482	6,106	7%	7%
Different State	192,761	205,267	14%	12%	5,117	7,778	7%	9%
Northeast	14,311	15,329	1%	1%	335	604	0%	1%
Midwest	28,270	29,457	2%	2%	503	761	1%	1%
South	73,548	72,497	5%	4%	1,598	2,134	2%	3%
West	76,632	87,984	6%	5%	2,681	4,279	4%	5%
Puerto Rico	110	398	0%	0%	10	20	0%	0%
Elsewhere	24,791	38,308	2%	2%	276	1,074	0%	1%

Source: US Census Bureau, Decennial Census, 1990 and 2000. Calculations by UNM BBER.

2.9 Challenges and Opportunities for Forest Management

The demographic data provided in this chapter for the Carson NF assessment area generally follow the demographics of the US as a whole – the population is aging, more racially diverse, with higher educational attainment, and increasing per capita incomes. More households are headed by women and are single person households.

However, to focus exclusively on the similarities between the US and the Carson NF counties would be to miss some very important developments over the past two decades. This is an area of changing economic fortunes, and many of these changes relate directly to changes in use of forest resources. The Carson NF has attracted an increasing number of recreational users. The local tourism industries expanded as did amenity migration by retirees and others and investments in vacation and second homes (see Tables 2.13 and 2.14). The housing stock expanded by about 10,000 units during 1990-2000 as the housing stock increased by about one-quarter in the assessment area. The 2000 Census found a very large number of vacant houses in Mora County (see Table 2.12). Over two-thirds of the vacant houses in Colfax and Taos counties were seasonal or vacation homes (see Table 2.14).

The population increased in all counties between 1980 and 2000 (see Table 2.2). Real per capita income rose in the four counties between 1990 and 2000 (see Table 2.7). More people with more income in the assessment area may be expected to continue to affect forest uses. In rural economies, typically more dependent on agriculture and other extractive uses, management decisions could have lasting impacts on the wealth and well-being of certain populations. Increasingly important will be a more diverse populace that is represented in decisions about the Carson NF. Counties where poverty is most prevalent include rural counties, those with high percentages of minority populations, those that exhibit lower levels of education, and those with more housing with no indoor plumbing facilities.

Finally, those seeking to live in or retire to the attractive forest surroundings are increasingly choosing to build houses within or adjacent to the National Forests and other federal public lands. Older migrants and younger educated migrants are moving from other places in the nation, often metropolitan areas, to places in the rural West to enjoy natural amenities rather than in pursuit of economic opportunities – to the contrary, incomes of those moving to rural areas often decline. These non-economic reasons include the physical amenity reasons of access to recreation, scenery, climate, and quality of environment, and social amenities such as access to family and friends and a slower pace of life.[37]

The trend discussed above is clearly happening in the Carson NF, particularly in the Taos area, the “Enchanted Circle” and on the other side of the mountains in Eastern Colfax County. Housing at the Wildland-Urban interface also impacts the Carson NF policies about fire and the reduction of fuel loads. Strategies for fighting fires when there are dwellings in the forest now must devote additional resources to the protection of the lives of their residents and their property. Residents at the forest’s edge may oppose thinning and thinning methods. Housing in the forest also can alter access and impact forest use. New roads built to developments can impact forest health by

[37] Nelson, P. (2000). Quality of Life, Non Traditional Income, and Economic Growth: New Development Opportunities for the Rural West. Rural Development Perspectives. 14(2):32-37.

creating runoff problems, air pollution problems and access to new areas where unmanaged recreation can occur.

3 Access and Travel Patterns

This chapter discusses access and travel patterns in each of the Carson NF's ranger districts (RDs). The analysis describes major traffic routes, major infrastructure improvements, and forest roads and trails. Finally, issues concerning travel management, namely the use of off-highway vehicles (OHVs) is considered.

The analysis is based solely on secondary data. Most information came from the New Mexico Department of Transportation (NMDOT) and the Highway Performance Monitoring System (HPMS), maintained by the Federal Highway Administration (FHWA). Online access of HPMS data is available from the Bureau of Transportation Statistics.[38]

3.1 Location of Major Transportation Routes

This section describes the transportation patterns typical of visitors or others traveling to and from the forest. Few major roadways travel through the Carson NF. These roadways also comprise the Enchanted Circle Scenic Byway. The byway loops around NM522, NM38 and NM64. Heading north from Taos, one can take NM522 to NM38 east/south to NM64 south/west back to Taos. An alternate route of the circle travels further through the Sangre de Cristo Mountains into the Valle Vidal area. The byway attracts visitors who come to enjoy the tremendous landscapes and views typical of northern New Mexico. **Figure 3.1** provides an illustration of the major transportation routes and airports in the area. **Table 3.1** lists the major roadways surrounding the Carson NF.

US64 cuts across (east-west) the southern portion of the Tres Piedras RD. FS Road 87 provides access to the Cruces Basin Wilderness area and other recreational sites in the northern part of the district. The Tres Piedras RD has the most miles of FS road with 1,151 miles, most of which are "native material." However, native material surfaces are generally impassible in inclement weather. Taos is the closest city to the Tres Piedras RD and Santa Fe is the largest city in the northern New Mexico area, located 90 miles from Tres Piedras. A small regional airport is located 10 miles to the west of Taos, with limited service to Santa Fe and Albuquerque. However, the airport in Albuquerque is most commonly used to enter and leave New Mexico. This major airport is approximately a two and a half hour drive from the village of Tres Piedras.

[38] Bureau of Transportation Statistics, "Highway Performance Monitoring System - Core Data," Bureau of Transportation Statistics, http://www.transtats.bts.gov.

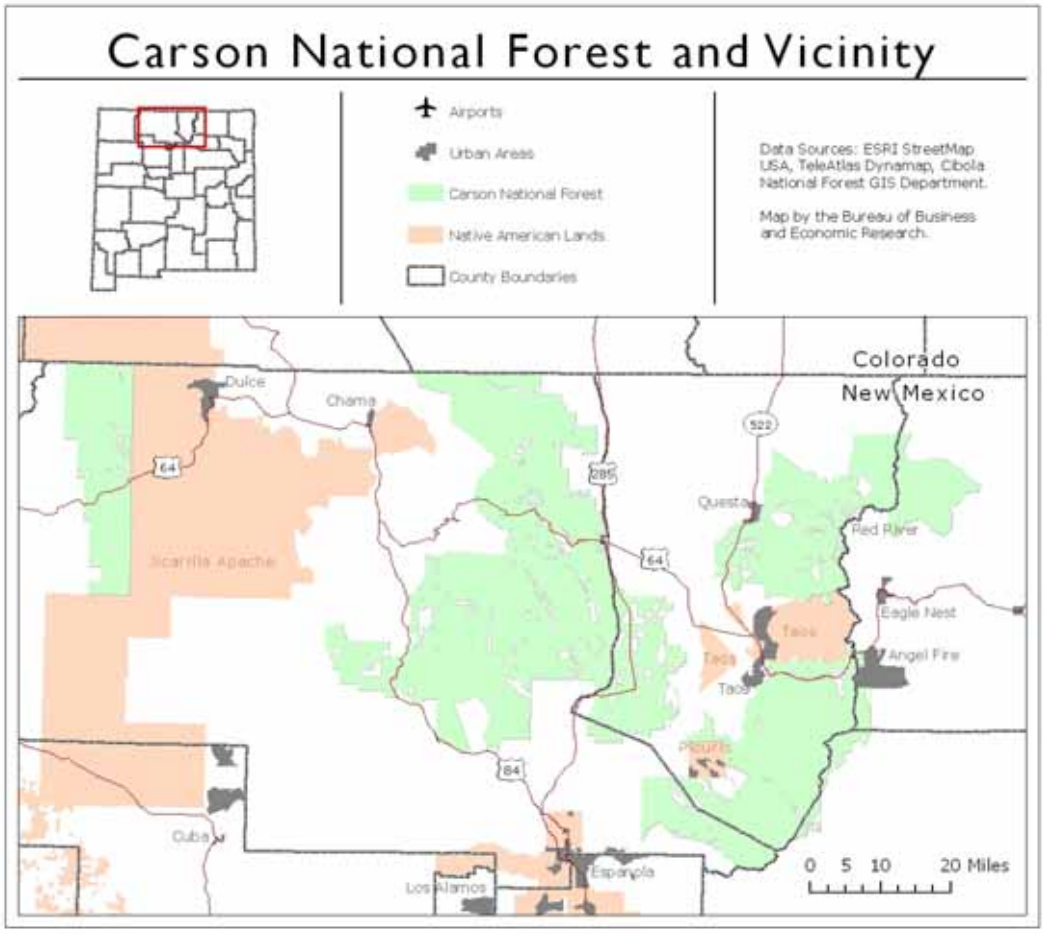

Figure 3.1: Map of Principal Highways in Region

The Questa RD is served mainly by NM522 and NM38. NM522 connects Taos and Questa, traveling through Arroyo Hondo and El Prado. NM 522 is the western section of the Enchanted Circle Scenic Byway and connects to NM38 in Questa. NM38 goes from Questa east to Bobcat Pass down through the Beaubin and Miranda Grant through Eagle Nest. This road makes up the northern and eastern section of the Enchanted Circle Scenic Byway. Just north of Questa, NM378 leads west through Cerro to the Rio Grande Wild River recreation area, home of the Rio Grande Gorge.

NM563 provides access to areas in the Latir Wilderness. It begins near Questa and leads northeast and becomes Forest Road 134 when it crosses into public land. The Valle Vidal Unit, surrounded by the Beaubin and Miranda Grant, is accessed with FS Road 150, which runs through the Valle Vidal Unit as the main east-west route. In the Valle Vidal Unit, FS Road 1910 starts near Cimarron campground and leads south.[39] The Valle Vidal Unit is discussed in a greater detail in Chapter 6.3.

[39] Other FS roads in the Valle Vidal Unit include: 1900, 1913, 1914, 1916 and 1950.

Table 3.1: Roadways Around The Carson NF

	Tres Piedras	Canjilon	El Rito	Questa	Camino Real	Jicarilla
US Route	US 84	US 64	US 64	US 64	US 64	US 64
	US 64	US 84	US 84			
	US 285		US 285			
State Road	NM 111	NM 96	NM 96	NM 38	NM 68	NM 527
	NM 519	NM 111	NM 111	NM 58	NM 75	NM 537
	NM 522	NM 554	NM 554	NM 68	NM 76	US 595
	NM 576			NM 552	NM 434	
					NM 518	
					NM 522	
					NM 567	

The Taos Ski Valley, a major attraction in the area, is nestled in the Wheeler Peak Wilderness and can be accessed via NM150. NM150 connects Taos Ski Valley to Arroyo Seco, traveling through Wheeler Peak Wilderness. This road can be accessed via NM64. Continuing west, this road connects to NM522 in Arroyo Hondo. Access to Wheeler Peak Wilderness is also provided by NM578, which runs from Red River past Fourth of July Canyon into the wilderness area.

The Camino Real RD, which is south of the Questa RD, is served by two major roadways (NM518 and US64) and several FS roads. NM518 runs southeast from Ranchos de Taos, through Santa Barbara (Sipapu and Tres Ritos) and continues through the Mora Land Grant into Las Vegas, NM. This road provides access to the Pot Creek Cultural Site near an area where it connects to Forest Roads 438, 439 and 476. US64 runs through the northern section of the RD, providing access to the El Nogal, Las Petacas, Capulin and La Sombra recreation sites. Another thoroughfare is NM 76, which connects Picuris Pueblo to Truchas, Chimayo and Española. This road goes through the Las Trampas Grant area of the RD.

The El Rito RD is served by two state roads and almost 900 miles of FS roads. NM111 travels through the district connecting US64 to NM554 and US285. NM554 runs into the town of El Rito. NM519 also runs through the district, connecting Las Tablas to NM111 near La Madera. Both NM519[40] and NM111 are designated as FS roads at various points along their routes through the RD.

Access to the Canjilon RD is via US84. The small community of Canjilon is located about 50 miles south of Pagosa Springs, Colorado and about 50 miles north of Española, New Mexico. US 84 runs along the southern perimeter of the Canjilon RD and is the southwestern leg of the Enchanted Circle Scenic Byway. NM 115 runs from US84 into the small town of Canjilon and then becomes FS Roads 137 and 559. FS Road 559 provides access to the Middle Canjilon Lakes, a popular fishing destination for Rainbow and Cutthroat Trout. FS Road 137 runs from the town of Canjilon southeast through Rincon Amarillo and connects with NM554 south of El Rito. About 35 miles away is the historic village of Chama which serves as the closest full-service community to Canjilon.

The only major roadway traveling through the Jicarilla RD is US64, which cuts through the area east-west. There are 478 miles of forest roads in the area providing access to various oil and gas

[40] NM519 changes to Forest Road 222 and connects to US285 near Tres Piedras, NM.

development sites. The forest roads are maintained by the FS as well as by many of the oil and gas companies leasing land in the area.

To help put the Forest in context; **Table 3.1** summarizes the principal roadways around the Carson NF. **Table 3.2** shows the distance of each RD to the major metropolitan statistical areas (MSAs) in the southwestern region of the United States. The Carson NF is isolated from other MSAs in the region and is situated in one of the least populated areas of New Mexico. The major population bases within reasonable driving distance are Albuquerque and Santa Fe. However many forest visitors and local residents come from smaller communities in the area. Many of the cities listed below have NF options that are closer than the Carson NF (the Santa Fe and Cibola National Forests, for instance), thus the Carson NF may not be the first choice for travelers.

Table 3.2: Distance from Major Cities to The Carson NF Ranger Districts

City	Tres Piedras	Canjilon	El Rito	Questa	Camino Real	Jicarilla
Albuquerque, NM	143	138	164	156	133	156
Amarillo, TX	361	356	314	306	291	442
Denver, CO	434	345	260	266	338	371
El Paso, TX	408	403	429	421	397	475
Farmington, NM	173	142	223	208	215	53
Las Cruces, NM	364	359	385	378	354	431
Lubbock, TX	394	389	380	373	324	475
Phoenix, AZ	606	601	627	620	596	500
Pueblo, CO	181	231	146	151	223	257
Roswell, NM	273	268	294	287	252	354
Santa Fe, NM	81	76	102	95	71	162
Tempe, AZ	620	615	641	633	609	514
Tucson, AZ	645	640	667	659	635	505

Source: http://www.mapquest.com

The Sonoran Institute found that the longer the drive between public lands and the nearest metropolitan area, the lower the potential for economic growth (particularly personal income).[41] Public lands that are far away from metropolitan areas do not get as many visitors as public lands near metropolitan areas like the Sandia RD in the Cibola NF, for instance, which is near Albuquerque, NM. In other words, forest areas that are isolated from major population bases are less likely to generate significant economic activity.

Table 3.3 shows lane miles in each county in the assessment area by road classification. Urban and rural road miles are the number of miles in urban and rural areas. NMDOT defines rural areas to be areas where the population is under 5,000 persons. Any area with more than 5,000 persons is defined as an urban area.[42] In all four counties there are only 165 miles of urban road and over 12,000 miles of rural road Rio Arriba County has the most miles of both urban and rural road (7,917) and Mora County has the least (1,136).

[41] R. Rasker, B. Alexander, J. van den Noort, and R. Carter. (2004). Prosperity in the 21st Century WEST. The Sonoron Institute.

[42] Bureau of Transportation Statistics, http://www.transtats.bts.gov/Tableinfo.asp?Table_ID=1102.

Table 3.3: Lane Miles of Road by County and Classification

Rural					
		Other Principal			
County	Interstate	Arterial	Minor Arterial	Collector & Local	County Total
Colfax	208	65	233	1,791	2,297
Mora	154	0	0	982	1,136
Rio Arriba	0	84	490	7,254	7,828
Taos	0	112	227	1,047	1,386
Total	362	261	950	11,074	12,648
Urban					
		Other Principal			
County	Interstate	Arterial	Minor Arterial	Collector & Local	County Total
Colfax	24	20	7	14	64
Mora	0	0	0	0	0
Rio Arriba	0	11	14	64	89
Taos	0	0	0	11	11
Total	24	31	22	89	165

Source: US Department of Transportation HPMS Database

Most roads in the assessment area are collector and local roads. According to the NM DOT Strategic Plan, the primary function of collector and local roads is to provide access to homes and businesses. In contrast, the function of interstate and arterial roads is to move people and goods efficiently. The roads near the Carson NF are not designed to handle heavy loads of traffic.

3.2 Airports

The Albuquerque International Sunport in Albuquerque, New Mexico is the largest and most-traveled airport in the state. Roughly six million travelers go through the airport per year.[43] However, this airport is more than one hundred miles away from any part of the Carson NF. Figure 3.1 showed no major airports in the vicinity of the Carson NF.

The nearest municipal airports to the El Rito RD are in Taos (~60 miles northeast) and Santa Fe (~60 miles south). Again, however, the largest and most traveled airport in the area is in Albuquerque, about 130 miles south. The closest airport to the Jicarilla RD is in Farmington, NM about 20 miles west[44]. The airport has daily commuter flights to Santa Fe, Albuquerque and other New Mexico cities.

Research conducted by the Sonoran Institute found that rural counties that are within an hour's drive of a mid-sized airport reap more economic benefits from public lands, since visitors will have more convenient access to the area. [45] A mid-sized airport (also called a Category I Airport) has between two and 20 million travelers per year and typically has no international flights.

[43] City of Albuquerque, "Albuquerque International Sunport," http://www.cabq.gov/airport/.
[44] Farmington Airport is 20 miles from the Forest District Office (Mt. Taylor RD), but may be further from forest lands, depending on reference point.
[45] R. Rasker, B. Alexander, J. van den Noort, and R. Carter. (2004). Prosperity in the 21st Century WEST. The Sonoron Institute.

Airports that have the most influence are those with daily commercial flights to major hubs, and more than 25,000 passengers a year. Besides the Albuquerque airport, the only other airport that comes close is in Santa Fe. Santa Fe municipal airport is serviced by commuter airlines as well as being open to private aircraft.

3.3 Traffic Flows

Table 3.4 shows estimated daily vehicle miles traveled (VMT) and VMT per lane mile by county for all counties in the assessment area. VMTs are calculated by multiplying the Average Annual Daily Traffic (AADT)[46] by road length in an area. VMT per lane-mile offers a useful measure of the intensity of road traffic, and is highly correlated with population density. The measure is also useful to compare traffic density among geographical areas.

Table 3.4: Daily Vehicle Miles Traveled

County	Estimated VMT	VMT per Lane-Mile
Colfax	673,508	285
Mora	387,063	341
Rio Arriba	1,251,928	158
Taos	712,677	510

Note: VMT is calculated as AADT*Section_Length

Source: US Department of Transportation (2001), HPMS Database, Calculated by UNM-BBER

Populations in the assessment area are quite small, so it is no surprise that traffic in the area is very light, especially in Rio Arriba and Colfax Counties. Given its high number of road miles, Rio Arriba County has the lightest traffic, with about 158 vehicles traveling any given stretch of road on a typical day. Taos County had the heaviest traffic in the assessment area, but it is still quite low relative to the rest of the state. In comparison, the 2001 VMT for Bernalillo County was 11.9 million with a VMT per lane mile of over 2,000.

Capital Outlays and Transportation Infrastructure Improvements

As part of Governor Richardson's Investment Program (GRIP), monies have been programmed for transportation infrastructure improvements throughout northern New Mexico. Many of the projects are along US64 and US84, both of which are major access routes running between Taos, Española and Tierra Amarilla. Below is a brief description of GRIP projects around the Carson NF.[47]

US 64, Rio Arriba County Line - E. to US 84 ($23.1 million)

The project includes reconstruction and shoulder widening of various sections along 20 miles of roadway. Improvements include bridge replacement, drainage structure replacement and pavement replacement. This route serves as the primary route for

[46] The daily flow of motor traffic is averaged out over the year to give an AADT, a useful and simple measurement of how busy the road is.

[47] Information and descriptions obtained from the NMDOT Strategic Plan 2004-2005.

tourism to Chama and Pagosa Springs from US550 and Dulce. The bridge joints are non-functioning with advanced section loss throughout. There is up to 20 ft of exposed rebar on several girders. In progress, ends December 2010.

US 84, Pojoaque to Española ($30.5 million)

Four lane new construction of an alternate route to bypass Española, reconstruction of US84 at tie-ins to relief route .Began February 2006

US 56, Springer East to Abbott ($11.5 million)

Enhanced two lane proposal is to resurface, restore and rehabilitate existing lanes with widened shoulders with some isolated areas of full reconstruction due to base failures. This section of US56 is a major travel route to and from Texas and Oklahoma to the recreational areas of northern New Mexico, began in June 2006.

US 64, West of Dulce ($9.6 million)

MP115 to MP125, this section of US64 lies between the towns of Blanco and Dulce. 2-lane reconstruction and rehabilitation; the existing pavement shows signs of base and subgrade failure with moderate to major pavement deterioration, so a two lane rehabilitation and reconstruction is planned.

US84 Romeroville South ($11.5 million)

Enhanced two lane proposal is to resurface, restore and rehabilitate the existing lanes with the addition of shoulders and drainage improvements. This route is a major connection between I-40 at Santa Rosa and I-25 near Las Vegas and carries a high volume of commercial traffic.

Outside of the GRIP projects, there are over 100 projects taking place in the assessment area; all working toward improving transportation infrastructure in the region. For example, a $10 million reconstruction project will improve road conditions on US64 between the Rio Arriba County line and the US84 junction. A similar project is taking place on US84 between Echo Amphitheater and the small town of Cebolla. US84 is a major access route connecting Española to Tierra Amarilla. US64 between Taos and Tres Piedras is slated for a $4.6 million road resurfacing, reconstruction and rehabilitation project to be completed in 2009. This section connects the Tres Piedras RD to the Camino Real RD. The Rio Grande Gorge Bridge (US84) is also due for a $2 million bridge rehabilitation in 2007. For an exhaustive list of capital improvement projects in the assessment area, refer to **Table A.3** in the appendix.

3.4 Forest Roads and Trails

Forest roads provide both forest users and FS officials access to areas of interest in the Carson NF. For some areas forest roads allow the only access to complete maintenance and rehabilitative activities. Access to the forest becomes critical in the event of a forest fire or other catastrophic event. In the context of the Carson NF, forest roads are the primary way to get in and around the forest, as most of the forest does not have paved roads to permit access. For example, the Jicarilla RD is covered with forest roads because the only main thoroughfare is US64, which runs east-

west through the center of the district. This is the case in much of the forest, as US64, US84 and US285 are the closest major highways; they surround the perimeter of many forest areas.

Table 3.5 below shows the length and type of forest roads throughout the Carson NF. In all, the Carson NF features almost 11,000[48] miles of forest road. The Tres Piedras and Camino Real RDs each have over 1,000 miles of dirt forest road. Together, the two districts contain about 20 percent of all forest roads in the Carson NF. The table also shows that about half of the forest roads are "natural material," most likely indicating a dirt road. Besides natural materials, the most common road treatment is crushed aggregate, but with only 216 miles. FS roads are typically not plowed or maintained during winter months, thereby limiting access during inclement weather.

The FS maintains designated areas of forest wilderness as roadless areas. These areas are the subject of national debates among environmental groups, forest resource interests and state and federal governments. This particular use of land is discussed further in Chapter 6, **"Special Management Areas.**"

[48] All figures regarding FS roads and trails were calculated using the INFRA Roads data set provided by the Forest Service.

Table 3.5: Length of Forest Roads and Road Types in The Carson NF

Tres Piedras	Surface Type	Segment Length Miles
SINGLE LANE	Asphalt	8
	Crushed Aggregate	39
	Bituminous Surface	0
	Improved Native	9
	Native Material	1,076
	Paved	0
	Other	0
Single Lane Total		1,132
DOUBLE LANE	Asphalt	0
	Crushed Aggregate	0
	Bituminous Surface	0
	Improved Native	8
	Native Material	11
	Paved	0
	Other	0
Double Lane Total		19
TOTAL		**1,151**

Canjilon	Surface Type	Segment Length Miles
SINGLE LANE	Asphalt	0
	Crushed Aggregate	21
	Bituminous Surface	0
	Improved Native	0
	Native Material	657
	Paved	6
	Other	0
Single Lane Total		684
DOUBLE LANE	Asphalt	0
	Crushed Aggregate	0
	Bituminous Surface	0
	Improved Native	0
	Native Material	0
	Paved	0
	Other	0
Double Lane Total		0
TOTAL		**684**

El Rito	Surface Type	Segment Length Miles
SINGLE LANE	Asphalt	0
	Crushed Aggregate	29
	Bituminous Surface	0
	Improved Native	0
	Native Material	847
	Paved	0
	Other	0
Single Lane Total		876
DOUBLE LANE	Asphalt	0
	Crushed Aggregate	0
	Bituminous Surface	0
	Improved Native	0
	Native Material	1
	Paved	0
	Other	0
Double Lane Total		1
TOTAL		**877**

Questa	Surface Type	Segment Length Miles)
SINGLE LANE	Asphalt	0
	Crushed Aggregate	1
	Bituminous Surface	0
	Improved Native	0
	Native Material	563
	Paved	1
	Other	0
Single Lane Total		565
DOUBLE LANE	Asphalt	0
	Crushed Aggregate	49
	Bituminous Surface	0
	Improved Native	5
	Native Material	76
	Paved	0
	Other	0
Double Lane Total		130
TOTAL		**695**

Camino Real	Surface Type	Segment Length Miles)
SINGLE LANE	Asphalt	3
	Crushed Aggregate	65
	Bituminous Surface	0
	Improved Native	0
	Native Material	1,054
	Paved	1
	Other	0
Single Lane Total		1,123
DOUBLE LANE	Asphalt	0
	Crushed Aggregate	12
	Bituminous Surface	0
	Improved Native	0
	Native Material	0
	Paved	0
	Other	0
Double Lane Total		12
TOTAL		**1,135**

Jicarilla	Surface Type	Segment Length Miles
SINGLE LANE	Asphalt	0
	Crushed Aggregate	0
	Bituminous Surface	0
	Improved Native	40
	Native Material	438
	Paved	0
	Other	0
Single Lane Total		478
DOUBLE LANE	Asphalt	0
	Crushed Aggregate	0
	Bituminous Surface	0
	Improved Native	0
	Native Material	0
	Paved	0
	Other	0
Double Lane Total		0
TOTAL		**478**

Unidentified District	Surface Type	Segment Length Miles)
SINGLE LANE	Asphalt	0
	Crushed Aggregate	0
	Bituminous Surface	0
	Improved Native	0
	Native Material	396
	Paved	0
	Other	32
Single Lane Total		428
DOUBLE LANE	Asphalt	21
	Crushed Aggregate	0
	Bituminous Surface	164
	Improved Native	0
	Native Material	0
	Paved	0
	Other	25
Double Lane Total		210
TOTAL		**638**

Carson Total	Surface Type	Segment Length Miles)
SINGLE LANE	Asphalt	11
	Crushed Aggregate	155
	Bituminous Surface	0
	Improved Native	49
	Native Material	5,031
	Paved	8
	Other	32
Single Lane Total		5,286
DOUBLE LANE	Asphalt	21
	Crushed Aggregate	61
	Bituminous Surface	164
	Improved Native	13
	Native Material	88
	Paved	0
	Other	25
Double Lane Total		5,658
TOTAL		**10,944**

Source: USDA Forest Service Infra Roads Database. Calculations done by UNM-BBER.

Table 3.6 depicts the number of miles of trails by each RD. No data was available for the Tres Piedras, Jicarilla, and El Rito RDs implying that there may not be developed or officially designated trails in those areas.[49] The Carson NF has 460 miles of trails total; about half of them being in the Camino Real RD. Across the entire forest, there are only 15 miles of trail specifically designated for off-highway vehicle (OHV) use; see Table 3.4 on previous page. A complete list of all trails in the Carson NF is provided in the appendix (**Table A.2**).

[49] No data was available in the INFRA Roads database.

Table 3.6: Length of Forest Trails and Trail Types in The Carson NF[50]

Canjilon District

Trail Type	Managed Use	Segment Length (in miles)
Standard/Terra	Hike	0
	Pack/Saddle	66
	ATV	0
	Cross Country	0
	Bicycle	0
	Motorcycle	0
	Total	**66**
Snow Trail	Hike	0
	Pack/Saddle	0
	ATV	0
	Cross Country	0
	Bicycle	0
	Motorcycle	0
	Total	**0**

Questa

Trail Type	Managed Use	Segment Length (in miles)
Standard/Terra	Hike	5
	Pack/Saddle	132
	ATV	7
	Cross Country	0
	Bicycle	2
	Motorcycle	2
	Total	**148**
Snow Trail	Hike	2
	Pack/Saddle	0
	ATV	0
	Cross Country	0
	Bicycle	0
	Motorcycle	0
	Total	**2**

Camino Real

Trail Type	Managed Use	Segment Length (in miles)
Standard/Terra	Hike	8
	Pack/Saddle	160
	ATV	8
	Cross Country	0
	Bicycle	5
	Motorcycle	65
	Total	**246**
Snow Trail	Hike	0
	Pack/Saddle	0
	ATV	0
	Cross Country	5
	Bicycle	0
	Motorcycle	0
	Total	**5**

Carson Total

Trail Type	Managed Use	Segment Length (in miles)
Standard/Terra	Hike	13
	Pack/Saddle	358
	ATV	15
	Cross Country	0
	Bicycle	7
	Motorcycle	67
	Total	**460**
Snow Trail	Hike	2
	Pack/Saddle	0
	ATV	0
	Cross Country	5
	Bicycle	0
	Motorcycle	0
	Total	**7**

Source: USDA Forest Service Infra Trails Database. Calculations by UNM-BBER.

The Carson NF Attitudes, Values, and Beliefs study revealed that many forest users perceive the forest trails to be in increasing states of disrepair, which can negatively affect recreational experiences. Trails with extensive damage are often closed for maintenance, increasing trail use in other areas. As a result, increased environmental damage and user conflict might arise among different types of users. The study participants suggest that access to more trails is needed to disperse use over a larger area.[51]

[50] Does not include user-created trails.

[51] J. C. Russell, J. and Adams-Russell, A. (2005). Attitudes, Values and Beliefs Toward National Forest System Lands: The Carson National Forest. USDA Forest Service.

3.4.1 Travel Management Planning

FS roads and trails are the focus of the FS Travel Management Planning process, which aims to re-designate and re-classify Forest-managed roads and trails. Under a 2005 FS policy, each NF in the country must designate roads, trails and other areas to dirt bikes and other off-highway vehicles (OHVs).[52] Once a system of roads and trails is designated, OHV use in any other areas of the forest is prohibited. OHV-designated routes and areas will be established after citizens have had an opportunity to express their thoughts on access issues, including the type of motorized travel appropriate to each area. [53]

The Travel Management Rule planning should be complete by September 2009. The first phase of the process is to collect and document the wants and travels needs of the public and other users and to educate them about the process and time table for implementation. The Carson NF officials began this stage in July 2006.[54] The FS is asking the public to contribute information about traditional trails and user created trails and to address whether or not these routes should be included in the designated system. Groups such as the Blue Ribbon Recreationists are encouraging the FS to incorporate many user-defined roads and trails onto the forest's map, as they are popular routes for OHV-enthusiasts.

3.5 Right-of-Way and Other Access Issues

Generally speaking, right of way issues are not a major concern in the Carson NF. However, that is not to say that they do not exist or will not exist in the future. Currently, there exists legal access to the major recreational areas, Taos Ski Valley and Wheeler Peak, which has not always been the case.[55] Problems arise where there is no legal right-of-way through private property or when property ownership changes. In most cases, private landowners do allow access, but with changes in property ownership that could change. To protect their privacy and property, many landowners block access to the forest with locked gates and "No Trespassing" signs. Forest visitors are often unpleasantly surprised when they encounter a locked gate or sign denying them access to the public forest.

When there are right-of-way issues, the FS tries to resolve them by purchasing easements following a trail or road through the property. In cases when the FS is unable to secure an easement, another strategy is to build an alternative trail or road that goes around private property. However, this is much costlier than purchasing an easement. Whenever any changes to public lands are proposed, the FS must first conduct an Environmental Impact Study (EIS) to determine if there are any possible negative impacts on habitats, wildlife and watersheds. Further, studies must be conducted that explore the presence of cultural resources and ensure they are not compromised by any changes. When the FS purchases an easement on an existing road these evaluative studies are nowhere near as costly.

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[52] States News Service. "Travel Management Begins on National Forest," June 23, 2006.
[53] Staci Matlock. "Forest Service to Hold Meetings on ATV Trails." *The Santa Fe New Mexican*. August 6, 2006, C-6.
[54] USDA Forest Service press release. http://www.fs.fed.us/r3/carson/news/2006/6_22_06_tmr_public-meetine.shtml
[55] Personal Communication with Forest Official, April 24, 2006.

According to a forest official, private landowners may not want to deal with the "hassle" of exercising property rights and building fences to limit access, especially if the access route is popular.[56] In the past, some visitors have torn down fences that are blocking access, although this is not a common occurrence.

Currently, the biggest access issue facing the Carson NF is in the Canjilon RD near Echo Amphitheatre and Ghost Ranch. The FS service is trying to secure an easement around FS Road 151, which travels through the Ghost Ranch area. So far, the FS has been unsuccessful in these attempts.[57]

3.6 Challenges and Opportunities for Forest Management

Forest lands that lack easy access to larger markets typically have the greatest influence on economic growth in the local rural counties, because forest lands become one of the few substantial economic forces in the area. [58] As a result, Forest management decisions regarding access and travel will have substantial implications to the socioeconomic vitality of the area.

In the Carson NF, the FS has many opportunities to interact with local residents and increase access to the area, providing the chance to stimulate economic activity. The major recreational sites have established rights-of-way. Open rights-of-way, along with the list of transportation infrastructure improvements slated for the next few years, ensure visitors' access to the forest for years to come.

Given the distance from the state's major airport, visitors to the forest are most likely residents of the surrounding communities and other parts of New Mexico. Communities like Taos and Santa Fe are already established "destinations" that attract visitors from all around the state and beyond. The Carson NF may be able to benefit by attracting visitors already in the area.

Enhancing access to natural amenities will not only attract more visitors but will also invite new residents. Often, new residents are educated individuals who have made their living being self-employed or from investments. Some researchers suggest that inviting these affluent people can stimulate economic development in an area.[59]

Another opportunity is to increase access within the forest. The FS is currently participating in a travel management planning process and is soliciting input from the public regarding travel wants and needs. Since summer 2006, Forest officials have been organizing town hall-type events to formally hear and document public opinion about how best to accommodate OHV recreation and preserve forest health. Once the travel management plan has been finalized and areas of the forest have been designated as OHV-use areas, there may be less tension between OHV users and other

[56] Ibid.
[57] Ibid.
[58] Shumway J.M. and S.M. Otterstrom. 2001. "Spatial Patterns of Migration and Income Change in the Mountain West: The Dominance of Service-Based, Amentity-Rich Counties." *Professional Geographer.* Vol. 53(4): 492-502. and R. Rasker, B. Alexander, J. van den Noort, and R. Carter. (2004). "Prosperity in the 21st Century WEST." The Sonoron Institute.
[59] Nelson, P. (2000). Quality of Life, Nontraditional Income, and Economic Growth. Rural Development Perspectives. 14(2): 32-37, and Rudzitis, G. (2000). Amenities Increasingly Draw People to the Rural West. Rural Development Perspectives. 14(2): 9-13.

users, as their paths may be less likely to cross. However, this may backfire – if a designated area becomes too congested or over-run with motor vehicles, some users will seek less crowded areas that are not designated for OHVs and these areas may sustain considerable damage.

Increasing access to the forest for visitors and new residents certainly carries inherent risks. Inviting more visitors and tourists may irritate long-time resident families who consider the land part of their heritage more than a recreational destination. Also, inviting more people to live near the forest has implications for the Wildland-Urban interface as more residential structures are being purchased and built around the forest. Later chapters will show discord between residents, visitors and newcomers, all of whom use the forest differently.

4 Land Cover and Ownership

This chapter examines issues related to land cover and land ownership in the Carson NF. The first section examines the various types of land cover in each of the ranger districts. The second and third sections discuss specific forest issues relating to land cover: invasive species and forest fires. The fourth section discusses recent land exchanges and the policy environment around future conveyances. These specific topics are important because they have significant implications for the forest's health and ways in which the land is used.

The geographic data for this section is taken from the United States Geological Survey National Land Coverage Data set (NLCD), a raster based Landsat imagery. The data is obtained for each county with a 30 meter resolution making the data fairly accurate. The Arc Info Geographic Information Systems software is used to extract the necessary data for each contextual geographic area. The FS provided the land exchange and conveyance data and the invasive species and fire information was obtained from discussions with Forest officials and the examination of archival sources.

4.1 Land Cover on the Carson National Forest

Table 4.1 provides land cover classifications for each ranger district based on data compiled in the NLCD. About 60 percent of the Carson NF (928,139 acres) is covered by evergreen forest. The second most common land cover is grassland, making up about 23 percent (359,737 acres). The Tres Piedras RD is the largest RD (388,147 acres) and about half of the district is covered by grassland (185,515 acres). Tres Piedras accounts for about 50 percent of all grassland in the forest. However, most of the grazing on the Carson NF is in the El Rito RD, which has the highest number of active grazing permits. El Rito is about 26 percent covered by grassland and 21 percent covered by shrubland, with 72,897 and 58,426 acres, respectively. The Questa RD, which has the Taos Ski Valley and Red River Ski Area, has over 200,000 acres of evergreen forest. **Figure 4.1** is a map illustrating land cover types on the Carson NF.

Table 4.1: Land Cover on The Carson NF (Acres)[60]

	Tres Piedras	Canjilon	El Rito	Questa	Camino Real	Jicarilla	Total Carson
Bare Rock/Sand/Clay	47	105	112	593	902	33	1,793
Commercial/Industrial/Trans	43	14	33	173	54	2	320
Deciduous Forest	3,156	1,696	1,275	3,483	2,402	1,371	13,382
Emergent Herbaceous Wetlands	0						0
Evergreen Forest	119,586	85,126	145,108	204,509	300,606	73,204	928,139
Fallow	3		**7**	4	6		20
Grasslands Herbaceous	185,515	41,318	72,897	31,115	21,220	7,673	359,737
High Intensity Residential							0
Low Intensity Residential				95	6		101
Mixed Forest	2,230	2,163	1,044	1,406		13,485	20,329
Open Water	77	8	17	81	8	6	197
Pasture/Hay	183	1,176	1,066	75	703	7	3,209
Quarries/Strip Mines/Gravel Pits	4	2	57	2,076	10		2,149
Row Crops	222		**1**	8		11	243
Shrubland	77,080	19,038	58,426	33,265	8,331	62,051	258,192
Small Grains							0
Transitional	1	13					14
Urban/Recreational/Grasses			2	1	1		5
Woody Wetlands						9	9
Total	**388,147**	**150,658**	**280,047**	**276,885**	**334,248**	**157,852**	**1,587,836**

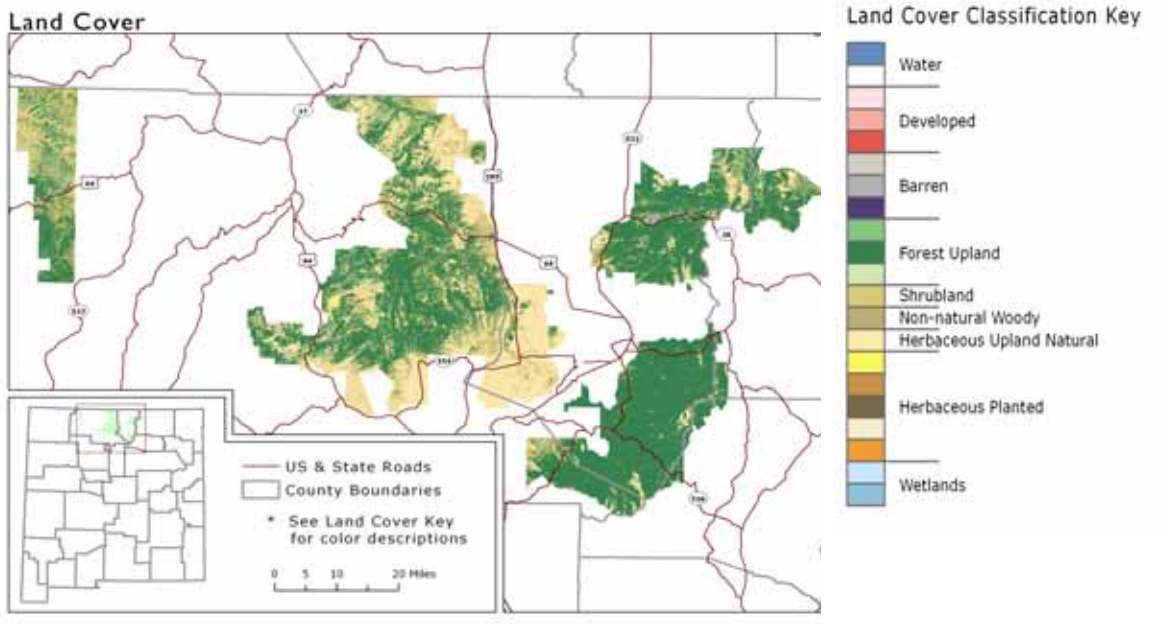

Figure 4.1: Land Cover on The Carson NF

[60] Values indicating '0' acres represent a value between zero and 0.5 acres.

4.2 Land Ownership

Overall, there are 105,010 acres of the Carson NF that are privately owned, making up seven percent of the entire forest. The two most common land covers, evergreen forest and grasslands, have differing proportions of land owned by private interests. Private landowners own only four percent of evergreen forest acres, whereas private interests own 12 percent of the grassland. Generally, economically viable land (such as grazing land) is more likely to be owned by private interests. It is also interesting to note that about a third of all privately owned evergreen forests (11,417 acres) are in the Questa RD, presumably the Taos Valley Ski Area. Similar patterns were revealed in the Cibola NF as well. **Table 4.2** shows, in great detail, the breakout of publicly and privately owned land in the Carson NF. **Figure 4.2** also shows the differences in land ownership in map form.

Table 4.2: Land Cover of Publicly and Privately Owned Land in The Carson NF [61]

	Tres Piedras			Canjilon			El Rito			Questa		
	NFS	Private	Total	NFS	Private	Total	NFS	Private	Total	NFS	Private	Total
Bare Rock/Sand/Clay	47	0	47	97	8	105	110	1	112	593	0	593
Commercial/Industrial/Trans	15	28	43			0	18	14	33	48	125	173
Deciduous Forest	2,670	486	3,156	1,497	200	1,697	968	307	1,275	3,312	171	3,483
Emergent Herbaceous Wetlands		0	0			0			0			0
Evergreen Forest	115,014	4,486	119,501	81,051	4,084	85,135	140,724	4,384	145,108	193,064	11,417	204,481
Fallow	2	2	3			0	6	1	7	2	1	4
Grasslands Herbaceous	163,801	21,819	185,620	34,921	6,398	41,320	65,922	6,985	72,907	28,213	2,910	31,123
High Intensity Residential			0			0			0			0
Low Intensity Residential			0			0			0	8	87	95
Mixed Forest	2,187	43	2,230	2,079	87	2,167	1,036	8	1,044	1,406	0	1,406
Open Water	74	3	77	8	0	8	17		17	77	4	81
Pasture/Hay	67	115	183	11	1,165	1,176	16	1,050	1,066	10	65	75
Quarries/Strip Mines/Gravel Pits	4		4	1	1	2	34	23	57	357	1,720	2,076
Row Crops	222		222		6	6	1		1			0
Shrubland	71,329	5,773	77,102	17,338	1,696	19,034	55,472	2,954	58,426	31,172	2,095	33,266
Small Grains			0			0			0			0
Transitional	1		1		13	13			0			0
Urban/Recreational/Grasses			0			0	0	2	2		1	1
Woody Wetlands			0			0			0			0
Total	355,432	32,756	388,187	137,003	13,658	150,661	264,326	15,731	280,056	258,262	18,596	276,858

	Camino Real			Jicarilla			Carson Total		
	NFS	Private	Total	NFS	Private	Total	NFS	Private	Total
Bare Rock/Sand/Clay	902		902	33		33	1,782	3	1,785
Commercial/Industrial/Trans	37	17	54	2	0	2	131	197	328
Deciduous Forest	1,885	517	2,402	1,346	25	1,371	11,677	1,702	13,382
Emergent Herbaceous Wetlands			0			0		0	0
Evergreen Forest	286,431	14,175	300,606	72,344	860	73,204	888,727	39,488	928,189
Fallow	2	4	6			0	12	8	20
Grasslands Herbaceous	17,447	3,772	21,220	7,207	465	7,673	317,474	42,246	359,710
High Intensity Residential			0			0			
Low Intensity Residential	0	6	6			0	8	88	97
Mixed Forest			0	13,357	128	13,485	20,066	267	20,330
Open Water	8		8		6	6	183	15	197
Pasture/Hay	24	678	703		0	0	133	3,079	3,208
Quarries/Strip Mines/Gravel Pits	9	2	10	7		7	403	1,759	2,161
Row Crops		2	2	11		11	242	7	250
Shrubland	7,669	662	8,331	59,110	2,941	62,051	242,097	16,139	258,224
Small Grains			0			0			
Transitional			0			0	1		1
Urban/Recreational/Grasses		1	1			0	0	5	5
Woody Wetlands			0	2	7	9	2	7	9
Total	314,414	19,836	334,250	153,420	4,432	157,852	1,482,937	105,010	1,587,947

Note: Small errors in calculations are the result of 'edge rounding' associated with the use RASTER based NLCD.
Source: USGS EROS, National Land Cover Data (NLCD), Date 1992 (New Mexico). Calculations by UNM-BBER.

[61] Values indicating '0' acres represent a value between zero and 0.5 acres.

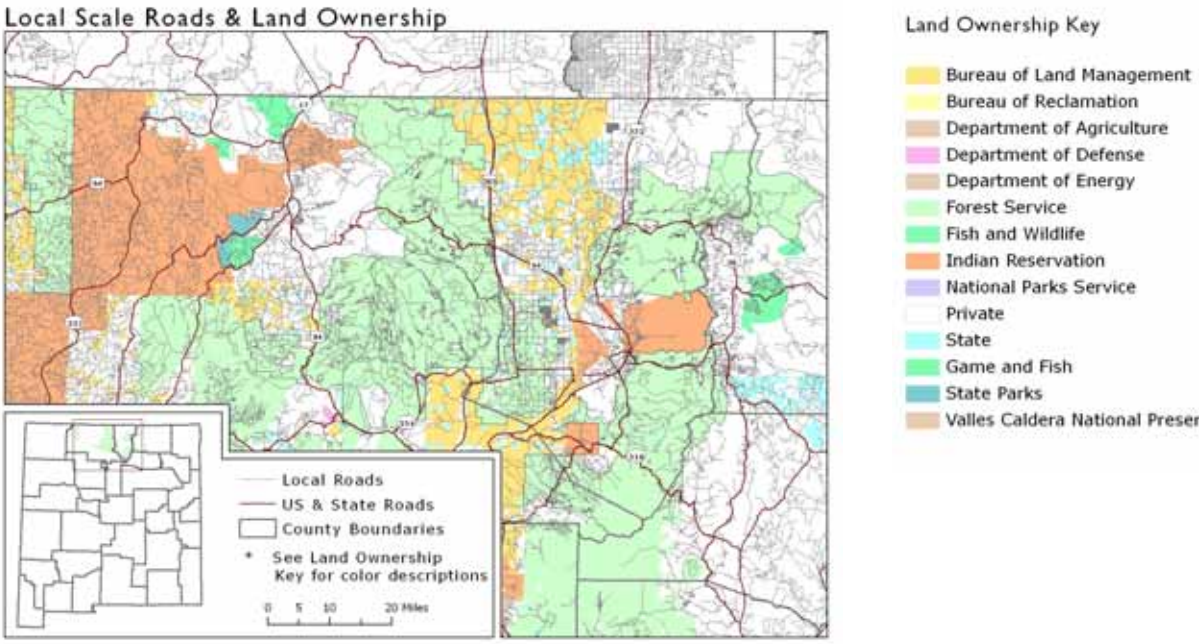

Figure 4.2: Land Ownership on the Carson NF

4.3 Land Conveyance and Exchanges

The FS provided BBER with data concerning land conveyances and exchanges in the Carson NF. Generally speaking, parcels of forest land scattered around the boundaries of the forest are often costly and difficult to manage, and pose significant right-of-way issues. However, FS officials have often expanded contiguous forest areas by trading isolated parcels for more valuable land on the edge of or inside forest's boundaries.

According to data provided by the FS, the last two land conveyances were in fiscal years 1988 and 1989. In FY1988, the FS exchanged about 20 acres of land (worth $91,200) for about 24 acres plus $18,500 cash with Angostura Homes. In FY1989, the FS obtained about 35 acres (valued at over $62,000) to be held in public trust under the Sisk Act of 1960. This act provided that any land that a NF receives from a past exchange becomes part of the national park or forest within which it was located. (See Charlton and Healy vs. United States for a full discussion of the Sisk Act).[62]

Land administrators in Region 3 have viewed transfers of land from National Forests, even for public purpose, as disappointments.[63] They view the transfer of public lands, which are available for general public use and enjoyment, to exclusive use of a certain segment of the population (without suitable recompense to the public) as contrary to the public interest. This was the underlying issue in the transfer of two areas from the Carson NF to Taos Pueblo; the Blue Lake

[62] Strickland et al v. United States, United States Court of Appeals for the Federal Circuit, http://caselaw.lp.findlaw.com/cgi-bin/getcase.pl?court=Fed&navby=case&no=995019.
[63] Timeless Heritage: A History of the Forest Service in the Southwest. (1988) USDA Forest Service.

area during the Kennedy administration and the Rio Pueblo Drainage during the Nixon administration. [64]

4.4 Invasive Species

Invasive species have been characterized as a "catastrophic wildfire in slow motion." Invasive plants and insects can cause major disruptions in ecosystem function. Invasive species can reduce biodiversity and degrade ecosystem health in forest areas. The damage caused by invasive organisms negatively affects the health of the forest and its resident wildlife, livestock, fish, and people.[65] Native species, such as the bark beetle, can cause significant damage when the forest's health is already compromised by other conditions.

In regards to noxious weeds, wildlife habitat can be compromised as they take over native plant communities. Palatable forage for game and non-game species of wildlife decreases as weeds like thistle, leafy spruce and yellow toadflax take over. Weeds such as black henbane, poison hemlock and yellow starthistle can poison animals. [66]

Invasive or noxious weeds are common in roads, trails, and riparian areas and can be spread by OHVs, grazing animals, visitors, and water flow. Many weed species can increase erosion. For example, Russian knapweed has a single, deep taproot and drives out native grasses that have better soil-holding root systems.[67] These weeds are a problem especially on US285 between Tres Piedras and Ojo Caliente.[68] Most invasive weeds are thistles (biennials and perennials), saltcedar, and Siberian elm. An example in the Carson NF area is the Canada Thistle (*Asteraceae*), which is common in the higher elevations of northern and central New Mexico. According to FS staff, Canada Thistle is present along roadways and is beginning to show in riparian areas.

One invasive weed species is posing an especially complex problem in the Valle Vidal Unit. The bullthistle, an annual biennial, has been found intermixed with native thistle. The two have begun hybridizing, making detection and elimination of the bullthistle virtually impossible. The best time to kill bullthistle is in its rosette stage. However, in its rosette stage, bullthistle looks exactly like the native thistle. The FS cannot simply eliminate all thistles because the native thistle is an integral player in the ecosystem, feeding butterflies and other species of pollinators. This frustrating situation hampers FS efforts to eliminate invasive weeds before they become an epidemic.

Drought conditions can both help and hamper the spread of noxious weeds. While water shortages can suppress the spread of some weeds, drought resistant weeds will have an advantage over native species which are suppressed by drought conditions.[69] Perennial pepperweed poses

[64] Timeless Heritage: A History of the Forest Service in the Southwest. (1988) USDA Forest Service
[65] US Forest Service, "Invasive Species Program," US Forest Service, http://www.fs.fed.us/invasivespecies/definition.shtml.
[66] USDA Forest Service, Final Environmental Impact Statement – Invasive Plan Control Project.
[67] Ibid.
[68] Personal Communication with Forest Official. April 25, 2006.
[69] Ibid.

another troublesome dilemma because the only effective non-herbicidal method of treating it is continuous flooding. Of course given the current drought conditions, the FS has limited options.[70]

Some forest areas in New Mexico came under heated criticism for the use of herbicides to kill noxious weeds. In January 2006, the Carson NF proposed to use herbicides, among other methods, to kill weeds in a 7,000 acre area.[71] However, environmental groups such as Carson Forest Watch[72] and resource advocates like the Gallinas Watershed Council[73] fear that herbicides can contaminate important watersheds like the Gallinas Watershed. This watershed is the principal source of water for Las Vegas, NM. Further, critics argue that herbicides pose risks to fragile aquatic life and sensitive wildlife pollinators, such as butterflies. [74] Special use permits for sheep and goats is perceived as one non-chemical approach for dealing with noxious weeds.[75] The Carson NF staff is currently re-evaluating its species control plan.[76]

The Carson NF is home to many chemical sensitive interests; like organic beef ranchers for instance.[77] Companies using the land to produce certified organic products have a vested interest in keeping herbicides out of the forests. The FS is working with these groups on plans that would treat invasive weeds before they reach the point where herbicides are the only real option. The FS is encouraging owners of adjacent properties to keep their "home place" clear, which would help make FS efforts more effective.[78]

In addition to noxious weeds, invasive species include insects that are problematic under certain conditions. For example, drought conditions are conducive to bark beetle epidemics. Species include the fir engraver (*Scolytus ventralis*), the piñon ips and the five-spined ips. Bark beetle populations "crashed" in 2004, but the forest is at risk for a new infestation due to the recent drought conditions. [79] Bark beetles are native to the southwest United States and play a positive function in the forests' ecosystems. Trees can usually live with bark beetle damage.[80] Beetles only reach infestation levels when the health of the trees has already been compromised by other factors, such as drought or overcrowding. Bark beetles feed on piñon trees (among others) causing them to dry out and die, resulting in higher fuel levels and increased fire danger.

The beetles attack trees by chewing through the outer bark and laying eggs. When the eggs hatch, the larvae feed on the soft, nutrient-rich inner bark. Further, the beetles introduce a blue stain fungus that spreads through and clogs the water and nutrient transfer materials, causing tree death. Once the insects mature, they leave the infested tree and travel to a new host.

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[70] Ibid.
[71] Associated Press, "Forester Rejects Herbicides in Santa Fe, Carson Forests," February 25, 2006.
[72] Associated Press "Environmentalists Want Alternatives for Killing Weeds," January 12, 2006.
[73] Dave Kavanaugh, " Watershed Herbicide Plan Draws Criticism; Invasive Weed Removal Debated." *Albuquerque Journal,* January 12, 2006. p.2.
[74] Joanie Berde, *The Santa Fe New Mexican*, January 14, 2006.
[75] J. C. Russell and P. A. Adams-Russell, Values, Attitudes and Beliefs Toward National Forest System Lands: The Carson National Forest (Placerville, CA: USDA Forest Service, 2005).
[76] Associated Press, "Forester Rejects Herbicides in Santa Fe, Carson Forests." February 25, 2006.
[77] Associated Press "Environmentalists Want Alternatives for Killing Weeds," January 12, 2006.
[78] Personal Communication with Forest Official. April 25, 2006.
[79] Tom Sharpe, "Preparing for the Worst," *The Santa Fe New Mexican*, February 21, 2006.
[80] USDA Forest Service, Southwestern Region, "Engraver Beetles in Southwestern Pines" Brochure, May 2003.

There is nothing that can be done to save a tree after it has been successfully attacked by the beetles and infected with a blue stain fungus. To make matters worse, tree mortality can occur very rapidly because beetles produce several generations each year. Due to the extent of the recent outbreaks, and the way in which they attack trees, there is little that can be done to kill them. According to FS officials, the beetle infestation will continue until drought conditions subside and trees recover their vigor. In order to reduce the impacts of future outbreaks, forest health must be improved by thinning overcrowded stands of trees. On average, the pine forests are 37 times denser than they were 100 years ago.[81]

Another insect species, the western spruce budworm (*Chloristoneura occidentalis*) is the most widely distributed and destructive defoliator of coniferous forests in Western North America.[82] There is no predictable pattern or trend as to where these pests attack. Most of the early epidemics (1909-1966) lasted for just a few years and then subsided on their own. Sometimes, the epidemic would last longer without spreading to larger areas. For example, an epidemic in the northern Rocky Mountains, which began in 1949, persisted for over 40 years, in spite of repeated insecticide treatments between 1952 and 1966.[83]

The most common host trees of the western spruce-budworm are: Douglas fir, White fir, Engelmann spruce and Blue spruce. In New Mexico, western spruce budworm defoliation continues to be chronic on the Carson (114,990 acres in 2004) and Santa Fe (68,720 acres in 2004) National Forests.[84]

When necessary, western spruce-budworm populations can be treated with chemicals. However, the populations are more likely to be regulated by changing conditions in the forest. For instance, a decrease in drought conditions can give trees the ability to fight off an attack. However, during prolonged outbreaks when large stands become heavily defoliated, the budworms may starve and die off. When in epidemic proportions, natural predators of the budworm, like arthropods, mammals and birds, have little to no effect on the budworms' mortality.[85]

4.5 Fire and Fuels

Much of the West has been under drought conditions over the last several years. Continued drought conditions combined with high fuel loadings have created dangerous conditions for many forest areas in the West. Fire threatens all major contributions of the forest, including recreation, watershed protection, timber, wildlife habitat and scenic beauty.[86]

In early March 2006, a grassland fire burned over 12,000 acres near Miami, NM, marking the beginning of a very ominous fire season for the Carson NF. Within six hours, the fire grew to

[81] USDA Forest Service. Strategic Communication Pine Bark Beetle.
[82] David Fellin and Jerald Dewey, "Forest Insect and Disease Leaflet 53," USDA Forest Service, http://www.treesearch.fs.fed.us/pubs/10990.
[83] Ibid.
[84] USDA Forest Service, Southwestern Region Forestry and Forest Health, *Forest Insect and Disease Conditions in the Southwestern Region*, 2004.
[85] David Fellin and Jerald Dewey, "Forest Insect and Disease Leaflet 53," USDA Forest Service, http://www.treesearch.fs.fed.us/pubs/10990.
[86] Stewart, S., Radeloff, V., and Hammer, R. 2003. Characteristics and Location of the Wildland Urban Interface in the United States. USDA Forest Service, Evanston: IL.

more than 10,000 acres. Forest officials said the fire was one of the earliest large wildfires anyone can remember in the area.[87] A smaller wildfire burned about ten acres near Bitter Creek in April 2006.[88] At the time, FS officials compared moisture and fuel loading conditions to those immediately prior to the Hondo Fire[89] and the Cerro Grande fire[90]; both had catastrophic effects scorching thousands of acres of land and homes.

The FS is facing increased urgency to reduce the hazardous fuel loads and reduce the likelihood of a crown fire near the adjacent communities. However, some residents are concerned with the methods used in reducing fuel loads in the forest (specifically with chemical means).[91] Common treatments to reduce fuels include thinning, prescribed burning, and clearing the forest of debris. In some cases, the FS will use herbicides to kill invasive weeds that become fire fuel.[92] In January 2006, the Carson NF conducted its first spring prescribed burn in the Shady Brook Area, near US64 and Taos Canyon.[93] The prescribed burns provide safer conditions for fire firefighters and allow them more access to protect homes near the forest.

To complicate matters, the Carson NF is facing a decreasing number of available firefighters.[94] An Albuquerque Journal article described how the Carson NF is temporarily suspending a program that trains and deploys on-call wildland firefighters. While the program is popular and training classes are always well-attended, the firefighters are mostly unavailable when they are called upon to help in a fire.

In an interesting development, the Carson NF offered only limited permits for firewood harvesting. Weather, resource and wildlife protection were considered in making the decision to limit the number of permits available. By decreasing the traffic in the forest during winter months, the FS is able to protect soils vulnerable to erosion.[95]

While one of the main responsibilities of the FS is fire prevention for the sake of minimizing damage to ecosystems and wildlife habitats, increasing levels of residential development add more implications to land management. Forest fires threaten the residential structures in areas in and around the forest, comprising the Wildland-Urban Interface (WUI). In the Rocky Mountains and the Southwest, almost all major urban areas have a significant amount of WUI, indicating recent "sprawling" patterns of residential growth.[96] People living in the WUI expect to have some influence on the management of nearby areas and will often pressure land managers on what to do and how to do it. As described in Chapter 2, there are more and more second homes

[87] Staci Matlock, "Fire Season Off to a Hot Start," *The Santa Fe New Mexican*, March 2, 2006.
[88] Associated Press, "Firefighters Respond to Blaze near Red River," April 24, 2006.
[89] Ibid.
[90] Matt Mygatt, "Dry Winter, Landscape Prompt New Mexicans to brace for a Grim Fire Season," Associated Press. March 8, 2006.
[91] Associated Press, "Environmentalists Want Alternatives for Killing Weeds," January 12, 2006.
[92] Ibid.
[93] Associated Press, "Carson National Forest to Conduct Shady Brook Prescribed Burn," January 23, 2006.
[94] John Arnold, "Carson Releases Fire Team; Dry Weather is Raising Concerns," February 6, 2006.
[95] U.S. Federal, "New Firewood Permits Unavailable this Winter on Carson National Forest." January 25, 2006.
[96] Stewart, S., Radeloff, V., Hammer, R. Characteristics and Location of the Wildland-Urban Interface in the United States. USDA Forest Service.

being purchased and built in the WUI. As a result, the FS is tasked with mitigating pressures of resource damage due to wildfire and intense social pressure to mediate risks and losses.[97]

4.6 Challenges and Opportunities for Forest Management

About 7 percent of the land on the Carson NF is privately owned. Further, FS-owned land in the Carson NF borders land owned and managed by a diverse set of private landowners, each with unique priorities and objectives. A principal challenge in managing forest resources against threats of fire, invasive species and other risks is the coordination of the land use management practices – the best efforts of the FS cannot be completely successful without compatible measures by other landowners.

For example, federal and private land managers must work together to eradicate invasive plant species. Otherwise, the efforts will prove ineffective. In the case of local businesses that are ranching organic beef and organically growing herbs, the businesses and FS must partner-up in order to create an effective treatment and prevention plan. Local residents should take more care to keep invasive plant species under control in private property, especially if they wish to keep herbicides out of the forests.

Much of the grazing land on the forest is owned and managed by private interests. Any decisions made by private land managers have implications for the FS-managed land. For example, overgrazing in some areas makes them vulnerable to invasive weeds, which can spread to other parts of the forest. This demonstrates an opportunity (and necessity) for the FS to work with local land managers on collaborative interventions for noxious weeds and preventative activities for fire.

The associated risk is that the FS is perceived as the ultimate land managers and forest health is solely the responsibility of the agency. Given the magnitude of the Carson NF's ecological issues, namely invasive species and forest fires, and the FS's limited options in resolving the situation may easily erode the public's confidence in the FS's ability to manage forest resources. For example, many expect that the FS will and should remove dead trees from around communities and adjacent to private lands[98]. Where dead trees become a threat to people and or property, removing the problematic trees becomes a major cost issue for both the agency and the public. Balancing the different needs of people and natural resources is the familiar challenge associated with managing the forest's health.

[97] Ibid.

[98] McKinley, J. and Johnson, K. "On the fringe of forests: where homes and fire meet', *New York Times*, June 26, 2007. This article presents a useful discussion of public-private risks and responsibilities associated with residential development along the borders of public lands.

5 Forest Uses and Users

An examination of how the Carson NF is used and whom it is used by is offered in this chapter. The first few sections feature a description of historical and current land uses. Following is a discussion of the different types of land users. In general, the FS allows the land to be accessed for a multitude of uses including: recreation, tourism, subsistence, and grazing. Further, the forest provides non-tangible benefits to the community and visitors, such as scenic resources, religious sites and other quality of life features. Many individuals and groups own, manage, and use forest resources, each interacting with the forest environment in a different way. As such, forest users have significant consequences for forest ecosystems and the people who depend on them.[99]

In 1960, Congress passed the Multiple Use Sustained Yield Act authorizing and directing the Secretary of Agriculture to develop and administer the renewable resources of the National Forests, including outdoor recreation, watershed, timber and wildlife resources in a way that would make them available indefinitely. Ideally, it meant that no one demand should take precedence over another. The forests were no longer exclusively for growing and harvesting timber, nor for the use of recreationists or as a habitat for wildlife, nor for cattle grazing. [100] Since the Act was enacted, the FS has adhered to the multiple-use mandate, promoting access and use to all. However, multiple-use introduces complications; inherent conflicts arise when guaranteeing access to all users. As more and more people (visitors and residents) access the forest, inevitably the result is increased likelihood of one type of use to impinge on another, resulting in conflict. Land-use conflict is a major challenge for FS officials because it pervades into practically every planning decision.

The following sections describe historical and contemporary land uses on the Carson NF and how they are related to its socio-economic impact.

5.1 Recreation

Recreation is the primary use of the Carson NF and is the main attraction for visitors to the area. Recreation on the Carson NF is concentrated to a few areas. For instance, the ski areas on the Questa RD are the primary destinations on the forest attracting the most visitors. The Questa and Camino Real RDs each have over 30 designated recreational sites, while the El Rito and Jicarilla RDs have few. **Table A.4** in the appendix lists all designated recreational sites on the forest, including trailheads, interpretive sites, campgrounds and ski areas.[101]

The FS estimates how many visitors access the forest with the National Visitor Use Monitoring (NVUM) survey. Data collected by the FS indicates that at least 1 million people visited the Carson NF in 1999-2000. More than half of the visitors are local residents taking day trips to the forest for recreational purposes.[102] Using data from the NVUM study, **Table 5.1** provides an estimate of how many people visit the forest for recreation and wildlife related purposes. Recreational visitors access the forest for purposes such as hiking, camping (overnight and day-only) and picnics. It is important to note that many areas of the forest are not “fee areas,” meaning

[99] J. F. Dwyer, “Integrating social sciences in ecosystem management: People-forest interactions in the urban forest,” in H.K. Cordell (Ed.), *Integrating social sciences and ecosystem management: A national challenge*, (Athens, GA: USDA, Forest Service, Southern Research Station, 1995).
[100] Full text of the Act is available at http://www.fs.fed.us/emc/nfma/includes/musya60.pdf .
[101] INFRA Recreational Sites Database, USDA Forest Service.
[102] National Visitor Use Monitoring Survey data provided by the USDA Forest Service.

visitors can access the site without charge. The wildlife data includes hunters, anglers, and wildlife "watchers" (photographers, birdwatchers, etc). The data is limited in that BBER is unable to determine the number of visitors to each ranger district or to identify where visitors are coming from. The least number of visitors are locals making overnight trips without staying on forest land.

Table 5.1: Number of Recreational & Wildlife Forest Visitors of The Carson NF

Type of Visit	Recreation	Wildlife
Non-local Day Travel to Forest	60,642	5,998
Non-local Overnight Stay on Forest Land	90,963	8,996
Non- local Overnight Without Stay on Forest Land	515,458	50,979
Local Day Travel to Forest	222,355	21,991
Local Overnight With Stay on Forest Land	30,321	2,999
Local Overnight Without Stay on Forest Land	10,107	1,000
Total Carson Forest Users	**929,846**	**91,963**

Source: NVUM Carson 2000. UNM-BBER

Undoubtedly, the most visitors come to ski, snowboard and snowshoe. In the Questa RD, there are two popular ski areas that attract the most visitors. Visitor spending is by far the most substantial catalyst for economic activity on the Carson NF. This will be discussed in full detail in Chapter 7, "**Economic Impacts."**

There is no clear indication that there will be a decrease in visitors, especially as the surrounding communities grow and transportation infrastructures improve. The NVUM data show that most visitors are local, so growing communities may translate to a growing visitor base. As will be described in a later section of this chapter, long-term residents of areas surrounding the forest (namely ranchers and Native American groups) perceive visitors and recreationists to have less commitment and investment in maintaining the integrity of the land, and treat it as such. As recreation and tourism interests become key stakeholders in the forest, the risk for major conflict may increase.

5.1.1 Hunting and Wildlife

As part of the forest's recreational offerings, the wildlife in the Carson NF attracts visitors, ranging from hunters to wildlife watchers. In 2001, 595,000 New Mexico residents participated in hunting, fishing, or wildlife watching in forest areas throughout the state, contributing about $1 billion to the state's economy.[103] NVUM data show that over 90,000 people visited the Carson NF to see or hunt wildlife in 2003. Refer back to **Table 5.1.**

Under federal mandate, hunting is regulated by the states, which are responsible for issuing permits and licenses. In New Mexico, permits for elk, deer and antelope are issued on a lottery basis to New Mexico residents and non-residents. The seasons and hunting dates are highly

[103] U.S. Department of the Interior, Fish and Wildlife Service, 50 State Reports, 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation, http://fa.r9.fws.

regulated on the Carson NF. A full description of elk and deer hunting regulations, using FS sources, can be found in the appendix, **Table A.5.**

During the autumn months, sportsmen and women make their way to the Carson NF, including the Valle Vidal Unit, for guided and unguided hunts. A later section in this chapter will show that hunting guides and outfitters purchase about 40 percent of all recreation-related special use permits on the forest. In New Mexico, small geographical areas in the NF are designated as hunting management "units." The units are used to identify hunting areas, as regulations regarding hunting dates and limits are set at the unit-level. The information below was gleaned from the FS website[104] and other sources, such as hunting related publications.

Hunting takes place in areas ranging from the sub-alpine peaks of the Sangre de Cristo Mountains to the high plains near San Antonio Mountain, depending on one's game preferences. Common game species in the Carson NF include Merriam's Turkey, Pronghorn Antelope, Mule Deer, Bighorn Sheep and Bull Elk. The Merriam's Turkey is native to the Carson NF. Through several successful reintroductions and established native populations, there is a sufficient population of Merriam's Turkey to support spring hunting on the Carson NF. Currently, spring turkey hunting seasons are available on an unlimited over the counter license for Unit 49 on the Camino Real RD, Unit 51 on the El Rito, Canjilon, and Tres Piedras RDs and Unit 53 on the Questa RD.

One of the most sought after big game species in North America is the Rocky Mountain Bighorn Sheep. Typically, hunts for this species occur at the highest elevations of the Sangre de Cristo Mountains within the two wilderness areas. Through past restoration efforts, there is now a population of Rocky Mountain Bighorn Sheep healthy enough to support very limited hunting.[105] Currently, Bighorn hunting seasons are available on Units 44/45 within the Pecos Wilderness Area on the Camino Real RD and Unit 53 within the Wheeler Peak Wilderness Area on the Questa RD.

Elk is the premier big game in the state and are probably the most popular big game hunted on the Carson NF. Management of elk on the Carson NF goes back to the early 1900's when Rocky Mountain Elk were first introduced into northern New Mexico. Today, the Carson NF boasts one of the largest elk herds in the state. Elk hunting opportunities are abundant on all game management units (2, 5B, 44/45, 49, 50, 51, 52, 53, and 55) and districts on the Carson NF. However, it is said that the best elk hunting is on the Valle Vidal Unit (Unit 55A) on the Questa RD.

Mule Deer are one of the most difficult and sought after big game animals in North America. Like most of the western states, Mule Deer began to decline in the late 1980's to early 1990's. As a result, management agencies began to manage deer herds in many different ways. On the Carson NF, current management practices, such as a limited deer-entry system has allowed mule deer herds to slightly rebound and stabilize. Mule Deer hunting on the Carson NF is available in all game management units. Limited quota deer-entry permits are available on a limited draw basis for game management units: 2B, 5B, 44/45, 49, 50, 51, 52, and 53. Archery, muzzleloader, or rifle hunts for deer are available on all the ranger districts and units on the Carson NF.

[104] USDA Forest Service. Hunting on Carson NF, http://www.fs.fed.us/r3/carson/html_main/list_hunting.htm.
[105] Ibid.

For fishing, the Carson NF offers 400 miles of cold mountain streams and numerous lakes, many stocked with trout by the NM Department of Game and Fish. Popular fishing streams include La Junta, Santa Barbara, El Rito, Rio Pueblo, Rio Hondo, Rio, Costilla, Red River, Rio San Antonio, and obviously, the off-forest Rio Grande. In terms of suitable lakes, there is Hopewell, Cabresto, Trout Lakes, Canjilon, Lagunitas and Shuree Ponds.

5.2 Grazing

Ranching activities are a defining characteristic to the heritage and social history of the communities immediately surrounding the forest. Grazing is one of the Carson NF's primary uses and is certainly embedded in the culture and history of the local residents. Even though it's not a major economic force, ranchers engage in this traditional activity because it is part of their lifestyle in rural New Mexico. Livestock animals are important components of household economies; most small ranchers no longer depend on their crops and animals for full economic support. The animals are typically used as a partial subsistence and as a means for special expenses or emergencies.[106] Ranchers in northern New Mexico have a different profit orientation than ranchers in other parts of the state. They do not do it to improve economic conditions, but do it in spite of them. [107] Local ranchers have maintained their way of life over generations even when it would make more economic sense to sell their land to developers and subdividers.[108]

According to forest researchers Raish and McSweeney, the majority of ranches in New Mexico are small, cow-calf operations with from one to ninety-nine head. Ranches of this size constituted 70 percent of the state's 8,313 ranches in 1996. That same year, in the north-central region of this state, small operations (less than 99 head) made up 82 percent of the 1,804 ranches. Large ranches in the north central region make up three percent of the total ranches, whereas statewide, large ranches account for seven percent of the total.[109]

In the context of the Carson NF, **Table 5.2**[110] shows the number of individual and association permits and allotments that are currently active. Currently, there are 183 active grazing permits on about 70 allotments. The El Rito RD has the most active permits, followed by the Canjilon RD.

[106] Raish, C, and McSweeney, A. (2003). "Economic, Social, and Cultural Aspects of Livestock Ranching on the Espanola and Canjilon Ranger Districts of the Santa Fe and Carson National Forests: A Pilot Study," USDA Forest Service, September 2003.

[107] Raish, C, and McSweeney, A. (2001). "Livestock Ranching and Traditional Culture in Northern New Mexico." *Natural Resources Journal*, vol. 41: 713.

[108] Thomas, J.W., and Gripke, S.L. (2002). "Maintaining Viable Farms and Ranches Adjacent to National Forests for Future of Wildlife and Open Space." *Rangelands*, 24(1).

[109] Raish, C. and McSweeney, A. "Livestock Ranching and Traditional Culture in Northern New Mexico," *Natural Resources Journal*, vol. 41 (2001): 713.

[110] Data was provided by the USDA Forest Service and is considered the best source of information pertaining to grazing permits.

Table 5.2: Number of Grazing Permits Sold on The Carson NF

	# Permits	# Allotments		
		Active	Closed	Vacant
Tres Piedras	21	17	0	0
Canjilon	41	12	0	0
El Rito	65	10	0	0
Questa	21	13	1	2
Camino Real	28	12	0	3
Jicarilla	7	6	0	0
District Total	**183**	**70**	**1**	**5**

Source: USDA Forest Service Grazing Permits and Grazing Allotment Databases

The cost of permits to graze on public land is subject to change and consistently faces considerable public scrutiny. Some believe that ranchers are paying less than fair market value for grazing fees. Comparisons are frequently drawn between the fees for grazing on private land versus the fees for grazing on federal land. According to a study of ranchers in the Santa Fe and Carson National Forests, the permittee rancher is sometimes criticized as being "subsidized" by the federal government. Others argue, to the contrary, that the additional costs associated with a grazing permit, such as upkeep and maintenance of improvements, make up for the difference in fees. Further, costs associated with public access (theft, vandalism and disruption of ranching operations) also increase operational costs for public land ranchers. As populations and recreation visits to public lands increase, such costs are expected to rise.[111]

Grazing fees are charged per animal-unit-month (AUM). The AUM is the amount of forage needed to sustain one cow and her calf, one horse or five sheep or goats for a month. The grazing fee for Western public lands was raised to $1.43 per AUM from $1.35 in 2003.[112] The 2005 fee is $1.79 per AUM.[113] [114] The INFRA database had substantial amounts of missing grazing fees data, so BBER was unable to calculate the total permit value. **Table 5.3** shows the AUMS present in the Carson NF from 1985 to 2002. The INFRA database also contains data indicating the acreage of grazing allotments. However, BBER staff was informed that the data represented "ballpark estimates" of acreage and the figures may include additional acreage such as BLM, private land and in-holdings. BBER was unable to determine how many acres of grazing were in each RD.

[111] Raish, C. and McSweeney, A. "Economic, Social, and Cultural Aspects of Livestock Ranching on the Espanola and Canjilon Ranger Districts of the Santa Fe and Carson National Forests: A Pilot Study," USDA Forest Service, September 2003.

[112] USDA Forest Service News Release: FS-0406, February 20, 2004.

[113] http://www.blm.gov/nhp/efoia/wo/fy05/im2005-067.htm.

[114] For more information about grazing fees, see "Livestock Grazing: Federal Expenditures and Receipts Vary, Depending on the Agency and the Purpose of the Fee Charged." United States Government Accountability Office, September 2005.

Table 5.3: Animal Unit Months on The Carson NF, 1985-2002[115]

Year	AUM
1985	NA
1986	NA
1987	125,705
1988	116,799
1989	13,017
1990	NA
1991	119,983
1992	119,983
1993	126,171
1994	108,171
1995	106,036
1996	105,523
1997	110,094
1998	107,949
1999	162,638
2000	144,792
2001	155,245
2002	147,474
Carson Total	1,769,580

Source: USDA Grazing Database

One of the greatest concerns facing ranchers is the tendency for ranch land to be sold and subdivided rather than continuing as agricultural land. When farms and ranches located near the NF are no longer economically viable, ranchers may be more likely to sell or subdivide their land to developers and new-comers. It is usually the desire to preserve qualitative features (history, tradition, etc) that keeps ranchers from selling. Operators of small, traditional ranches rank quality of life above making a profit.[116] Beyond the lifestyles of the residents, open space around the forest may also be at risk if farms and ranches are not economically viable.[117]

5.3 Timber

Timber has long been a traditional use in the Carson NF, but is not a major commercial draw. **Table 5.4** shows the value of timber sales from 2000 to 2004. The "Sales" column shows the amount collected by the USAD FS for rights to harvest the forest, such as permits and other fees. The "Cut" column indicates how much was collected from the sales of the cut timber. The data show that cut timber brought in about $100,000 each year between 2000 and 2004.

[115] Note: Data obtained from forest-level hard copy records. Reliability of the data is unknown as only available records were utilized. Records may be missing for any given year. Cells with data missing indicate data is not available. Reliability of the data is unknown as only available records were utilized. Records may be missing for any given year.

[116] Raish, C., Yong, W. and Marzluff, J. (1997). "Contemporary Human Use of Southwestern Ponderosa Pine Forests." USDA Forest Service General Technical Report, RM-GTR-292.

[117] Jack Ward Thomas and Stephanie Lynn Gripke, "Maintaining Viable Farms and Ranches Adjacent to National Forests for Future of Wildlife and Open Space," *Rangelands* 24(1), 2002.

Table 5.4: Timber Sales on The Carson NF, 2000-2004

Year	Sales	Cut
2000	$90,475	$108,963
2001	$105,773	$114,347
2002	$82,755	$104,419
2003	$108,401	$111,780
2004	$108,202	$98,293
Carson Total	**$495,606**	**$537,801**

Source: USDA TIMS Database

According to the TIMS database, the most profitable forest product in 2004 was fuelwood, which accounts for about 85 percent (about $2 million) of the total timber cut value for 2004. This follows a trend common to other forests. For example, fuelwood accounted for 88 percent of the total 2004 timber cut value in the Cibola NF. The timber industry is not a major economic force in the area, nor does it provide many jobs, as Chapter 7 will show. **Table 5.5** shows the value of special products produced with forest timber resources.

Table 5.5: Non-Timber (Special) Product Activity on The Carson NF, 2004

Type	Cut Volume (MBF)	Sales Volume (MBF)	USFS Value	Price per MBF or Cord	Cut Value	Sold Value
Soft Sawtimber	40	59	$642	$397	$23,391	$23,391
Hard Sawtimber	36	42	$77	$425	$18,003	$18,003
Pine Pulpwood	0	0	$0	$62	$0	$0
Hard Pulpwood	0	0	$0	$62	$0	$0
Soft Poles	458	558	$24,065	$557	$310,382	$310,382
Hard Poles	29	5	$135	$557	$2,705	$2,705
Soft Posts	5	6	$830	$4	$24	$24
Hard Posts	14	10	$278	$4	$62	$44
Fuelwood	5,869	6,243	$52,968	$320	$1,877,926	$1,997,760
Misc. Convert	0	0	$65	$0	$0	$0
Christmas Trees	1,105	1,581	$7,930	$0	$0	$0
Misc. Not Convert	0	0	$0	$0	$0	$0
Transplant	0	0	$0	$0	$0	$0
Carson Total	**7,555**	**8,503**	**$86,990**	**$2,387**	$2,232,493	$2,352,308

Source: USDA Forest Service TIMS Database

5.4 Oil and Gas

Oil and natural gas development is the primary use of land on the Jicarilla RD, which lies in the Chama Municipality of Rio Arriba County. There are over 600 active oil wells on the district, as illustrated in **Figure 5.1**. Data show that many revenues produced by oil and gas development are not integrated back into the local economy. Although there is unlikely to be any significant economic impact directly from the extraction of oil and gas, the local region does receive benefit in the form of state and local taxes and FS tax disbursements for transportation and road costs. Chapter 7, **"Economic Impact,"** discusses oil and gas exploration in full detail.

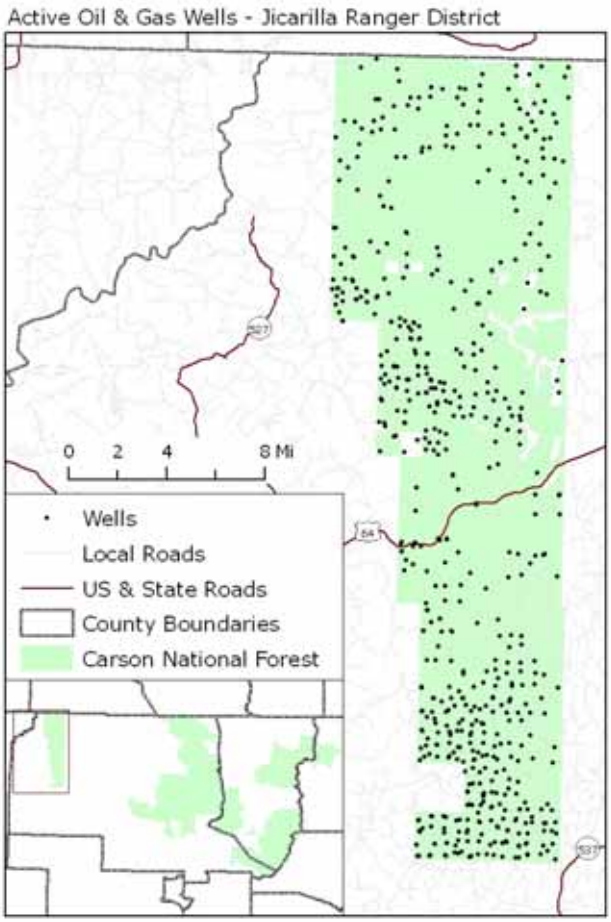

Figure 5.1: Active Oil and Gas Sites (Jicarilla RD)

Oil and gas development is already taking place in the Jicarilla RD, but mineral resource interests have pursued the possibility of mineral exploration in the Valle Vidal Unit on the Questa RD. The Valle Vidal Unit of the Questa RD is about 100,000 acres of undeveloped land that is currently a multiple-use area and is mostly used for recreation, such as hunting and camping.

5.5 Special Use Permits

The Carson NF sanctions the use of the NF lands by issuing special use permits. Permits authorize occupancy, usage, rights to and privileges on the forest lands. The permits allow for a wide range of activity on the forest as a whole, but each district is utilized for only a few purposes. Using special use data provided by the FS, **Table 5.6** shows that each RD appears to have a different concentration of special uses. Also reported below is the amount of "rent" collected for each permit category. Rent includes permit fees and other related charges.

Table 5.6: Special Use Permits on The Carson NF (1949-2005)

Permit Category	Tres Piedras # Active	Tres Piedras # Closed	Tres Piedras Rent Total	Canjilon # Active	Canjilon # Closed	Canjilon Rent Total	El Rito # Active	El Rito # Closed	El Rito Rent Total
Recreation	8	10	$3,190	5	8	$720	1	0	$0
Agriculture	5	0	$182	-	-	-	1	0	$61
Community/Public Information	5	0	$0	3	0	$3,000	13	0	$0
Feasibility, Research, Training, Cultural Resources, & Historical	1	0	$0	1	0	$0	-	-	-
Industry	2	0	$0	0	1	$0	1	0	$0
Energy Generation/Transmission	2	0	$0	1	0	$0	5	0	$1,205
Transportation	16	0	$546	8	1	$61	10	0	$308
Communications	16	1	$7,768	2	0	$1,862	5	0	$1,409
Water (Non-Power Generating)	14	0	$61	13	0	$125	13	0	$121
TOTAL	**69**	**11**	**$11,746**	**33**	**10**	**$5,767**	**49**	**0**	**$3,104**

Permit Category	Questa # Active	Questa # Closed	Questa Rent Total	Camino Real # Active	Camino Real # Closed	Camino Real Rent Total	Jicarilla # Active	Jicarilla # Closed	Jicarilla Rent Total
Recreation	60	21	$47,526	35	16	$21,272	11	2	$1,208
Agriculture	-	-	-	1	0	$61	3	0	$0
Community/Public Information	12	0	$182	5	0	$0	-	-	-
Feasibility, Research,Training, Cultural Resources, & Historical	1	0	$0	23	4	$549	3	0	$61
Industry	4	0	$61	3	0	$0	-	-	-
Energy Generation/Transmission	6	1	$0	5	0	$0	16	0	$0
Transportation	34	1	$1,645	22	1	$737	2	0	$0
Communications	10	0	$14,966	5	1	$1,687	1	0	$0
Water (Non-Power Generating)	29	0	$668	14	1	$364	3	0	$0
TOTAL	**156**	**23**	**$65,048**	**113**	**23**	**$24,670**	**39**	**2**	**$1,269**

Notes: 1). Permits Issued Encompass Those from 1952-2005. 2). The Number of Active Permits were calculated as "the number of issued minus the number of closed and revoked permits for each district."

Source: USDA Forest Service 2005 Special Use Permit Database (SUDS). Calculations by UNM-BBER..

The Questa RD, which has the most open permits, has the largest number of recreation permits. The Questa RD also collected the largest amount of rent ($65,048), with most coming from recreation permits. The Camino Real RD also has a high number of recreation-related permits, but it also has a significant number of cultural resources, such as the Pot Creek area. About forty percent of all recreation permits on the Carson NF are for guides and outfitters.

The largest number of permits in the Canjilon RD is for water-related uses, most likely on the lakes in the area. Most rent in the district, however, comes from the three community and public information permits. In the Jicarilla RD, the most common special permit is for energy generation and transmission, which are typically issued for gas pipelines and distribution lines.[118]

[118] Personal communication with FS staff.

5.6 Illegal Uses

Table 5.7 lists the most common violations on the Carson NF. In 2005, the FS recorded less than 60 violations in their LEIMARS[119] database. Illegally taking timber and forest products was the most common offense followed by general sanitation-related offenses.

Table 5.7: Violations on The Carson National Forest

Code	# Incidents	Violation Categories
36CFR261.6	17	Timber and other forest products (General Prohibitions)
36CFR261.11	11	Sanitation (General Prohibitions)
36CFR261.5	6	Fire (General Prohibition)
18USC111	4	General Prohibitions
36CFR261.56	4	Use of vehicles off National Forest System roads
36CFR2619A	3	Property
36CFR261.15	2	Admission, recreation use and special recreation permit fees
18USC1361	1	Government Property or Contracts
21USC844	1	Prohibited and Unlawful Acts
36CFR261.3	1	Interfering with a Forest Officer, volunteer, or human resource
18USC1855	1	Timber Set Afire
18USC641	1	Public Money, Property, or Records

Source: USDA Forest Service, LEIMARS, 2005

A focus group study exploring attitudes and values toward the Carson NF found that local residents perceive increased enforcement and education to be the best way to address several problems that can adversely affect forest resources and user experiences: growing vandalism, litter, off-trail riding by OHV and mountain biker riders, and tree and wildlife poaching. Many residents believe the problematic behavior is more common among visitors and recreational users, as they are not as invested in the well-being of the land.[120] The discussion of land use would not be complete without and in-depth examination of the land users themselves.

5.7 Forest Users

The history of the northern New Mexico region deeply influences how land is used and still shapes many of the current land-use issues. Changes in the economy have resulted in changes in who acts as the forest's stakeholders. Russell succinctly described how, in the past, the stakeholders were ranchers, farmers and extractive industries and now it is the recreation and tourism industries that have the most interest in forest land use.[121] This shift from traditional to recreational uses has also created a distinction between the types of users that access the forest.

There is a difference in usage between the area's newcomers and those whose families have been around for generations. Long-term residents have worked on the land and have sustained

[119] Law Enforcement and Investigations Management Attainment Reporting System.
[120] J. C. Russell and P. A. Adams-Russell (2005) Values, Attitudes and Beliefs Toward National Forest System Lands: The Carson National Forest. (Placerville, CA: USDA Forest Service, 2005).
[121] Ibid.

themselves for generations. As such, they often have a well-developed sense of attachment and entitlement to the land.[122] Newcomers are often perceived to not have the same land ethic and values about natural resources as do longer –term residents. Similarly, newcomers are often perceived as under-appreciating and not understanding some of the traditional uses, such as grazing. A humorous anecdote told by long-time ranchers described affluent newcomers as complaining about, "cows on their Kentucky blue grass lawns."[123] A difference also exists between resident 'locals' and non-local recreational users. It is common for residents to believe that non-local recreational users have less responsible values about forest resources than local residents. Non-local residents also demand more from the land and from the FS. As a respondent in Russell's study indicated,

Tourists expect more now than in the past. They want more activities in the mountains and more well-maintained trails. They want more facilities…. And more options to fish, hike, camp, drive jeeps and mountain bike and horseback ride and more… They want more than they ever have and it's going to put pressure on the Forest Service and the rest of us to manage it better.

From another perspective, many recreational users and environmental advocates often perceive the FS to give priority to traditional users as a way to avoid conflict. As an example, in a personal discussion with a Forest official, he explained, "as long as they can ranch, they won't say anything." According to some, traditional users use the land to do whatever they want without regard for anything or anyone else simply because they live there. [124]

While many forest users are hesitant to limit access of others, increasing attention is being given to how some users are degrading the land and the experiences of other users. This is especially true with the growth of unmanaged recreation and the popularization of OHVs.[125]

The use of OHVs is a hot topic among traditional and recreational users and is a major rallying point in the multiple use debate. The FS acknowledges that unmanaged recreation, namely OHV use, is one of the four largest threats facing the NF System. According to the FS, OHV ownership has grown from 5 million in 1972 to 36 million in 2002.[126] On November 2nd, 2005, the FS announced its Travel Management Rule concerning OHV recreation in National Forests and Grasslands.[127] New guidelines provide different strategies for combating the growing negative consequences of OHV use in the forests. The new rules went into effect on December 9, 2005.[128] Generally, these policy revisions call for the re-designation of trails and routes – including modifying FS maps to show which trails are designated for different types of uses. In the Questa

[122] Raish, C. and McSweeney, A. "Livestock Ranching and Traditional Culture in Northern New Mexico," *Natural Resources Journal*, vol. 41 (2001): 713.
[123] Ibid.
[124] J. C. Russell and P. A. Adams-Russell, Values, Attitudes and Beliefs Toward National Forest System Lands: The Carson National Forest. (Placerville, CA: USDA Forest Service, 2005).
[125] J. C. Russell and P. A. Adams-Russell, Values, Attitudes and Beliefs Toward National Forest System Lands: The Carson National Forest. (Placerville, CA: USDA Forest Service, 2005).
[126] US Forest Service, Four Threats - Questions and Answers, http://www.fs.fed.us/projects/four-threats/questions-answers.shtml.
[127] Final Rule for Motorized Recreation in National Forests & Grasslands. USDA Forest Service. http://www.fs.fed.us/news/2005/releases/11/travel-management.shtml.
[128] The Federal Register/vol. 70, No. 216/ Wednesday, November 9, 2005/Rules and Regulations, P. 68264, http://www.fs.fed.us/recreation/programs/ohv/final.pdf.

and Camino Real RDs, seven and eight miles of trails are currently designated specifically for OHV use, respectively. [129]

5.8 Challenges and Opportunities for Forest Management

Changes in land use often follow shifts in the economy. As principal economic activities shift focus from traditional (grazing, timber) activities to service-based (recreation, tourism), there is a resulting change in stakeholders. Previously, until the mid to late-20th century, stakeholders were the ranchers, farmers, loggers and others who worked to extract natural resources from the forest. Now and increasingly, recreation and tourist-based industries have a more vested interest in the decision making and planning of forest uses. Changes in land use also correspond to changes in forest management priorities. In the early part of the 1900s, a major objective of the FS was to manage resource development, whereas the priorities now include environmental and cultural preservation.

In debates regarding land use and especially special areas, there appears to be conflict over who has "more" rights to the land. While the forest is public land and everyone should have access, some believe they should have privileged status when it comes to forest planning and decision making. For instance, grazing interests in the El Rito RD are frustrated by the political pull of "non-local" environmental groups who do not have the level of knowledge and understanding of the land that the ranchers possess. Residents near the Questa RD may perceive large numbers of visitors as potentially harmful to the integrity of the area. Another example is Native American groups who identify with the area as their "homeland."[130] Some tribal groups perceive they have a permanent attachment to the land that is very different from other relationships. They do not consider themselves visitors to the forest, as they do not come from another place, and as such many feel that they should have an active and influential role in decision-making processes.

Another common complaint regarding the management of special areas is the perception that decisions are made without adequately inviting comments from the public or other interested parties. This has certainly been the case with land exchanges and tribal land use conflicts, even though the FS has formal procedures for inviting public comments.

In any decision or plan made by the FS, there is always the risk of upsetting individuals and groups who have differing agendas. Each type of user has different – often opposing -- expectations of the land, its use and of the FS. This puts the FS in a precarious situation, as the agency is seen as the arbiter of land uses. As with any management issue, the FS faces a number of opportunities and challenges.

While grazing is not the primary economic activity on the Carson NF, it is still one of the most culturally significant uses. Conflicts between ranchers and some conservation groups (among others) are causing the public and the FS to evaluate the impacts of grazing on public land. Those critical of current grazing practices (and even a few FS staff[131]), often argue that grazing causes soil compaction, reducing the absorption of rainfall and also the recharge of aquifers and water

[129] INFRA Trails Database, USDA Forest Service.
[130] INFRA Trails Database, USDA Forest Service.
[131] See Letter to Editor by ex FS Biologist Leon Fager in *Albuquerque Journal* July 10, 1998.

tables.[132] Others will argue that grazing allows livestock to trample much of the overgrown brush that has become such a fire danger.

Ranching interests often perceive environmental groups (and other interests) as 'non-local' entities who do not understand the land and its condition as much as those who depend on it for their livelihood. Traditional users often have a sense of entitlement to the use of forest resources because of traditional and long-standing ties to the land and agreements with the FS.[133] Further, they are often critical of FS plans, and believe the agency is letting the political agenda of a few drive decisions that will have long term effects, and only for short term gain. Rather, the residents believe that their traditional use has resulted in a body of knowledge and beliefs about forest conditions and health, which is better suited to inform decision making.

When considering land use plans and policy decisions, the FS has the opportunity to mediate the interests and activities of the "new" stakeholders and traditional stakeholders. One way, which was described in two of Russell's ethnographies, is to engage folk knowledge. Moving beyond a formal public input session, which many believe are just lip-service and serve no meaningful function, FS managers can move from "collecting" public input to "engaging" public input. As a later chapter will show, collaborative efforts between the FS and others are a crucial way of conducting business and implementing projects. Changing common perceptions and making others believe that they have a meaningful and effective voice in policy making can cultivate collaboration.

With all policy actions, the FS runs the risk of alienating some user groups while addressing the needs of others. Moreover, the FS runs the risk of losing the trust of local communities as effective land managers.

[132] It can also be argued that mountain-biking and other recreational uses can also cause soil compaction and other damage.

[133] J. C. Russell and P. A. Adams-Russell, Values, Attitudes and Beliefs Toward National Forest System Lands: The Carson National Forest. (Placerville, CA: USDA Forest Service, 2005).

6 Special Areas

This chapter describes special areas on the Carson NF, including recreational sites, Inventoried Roadless Areas (IRAs) and Wilderness areas. Special management areas are designed to protect fragile ecosystems, minimize human impact and preserve cultural significance of areas used for traditional purposes. **Figure 6.1** depicts the primary special management areas on the Carson NF, which are described in the following sections.

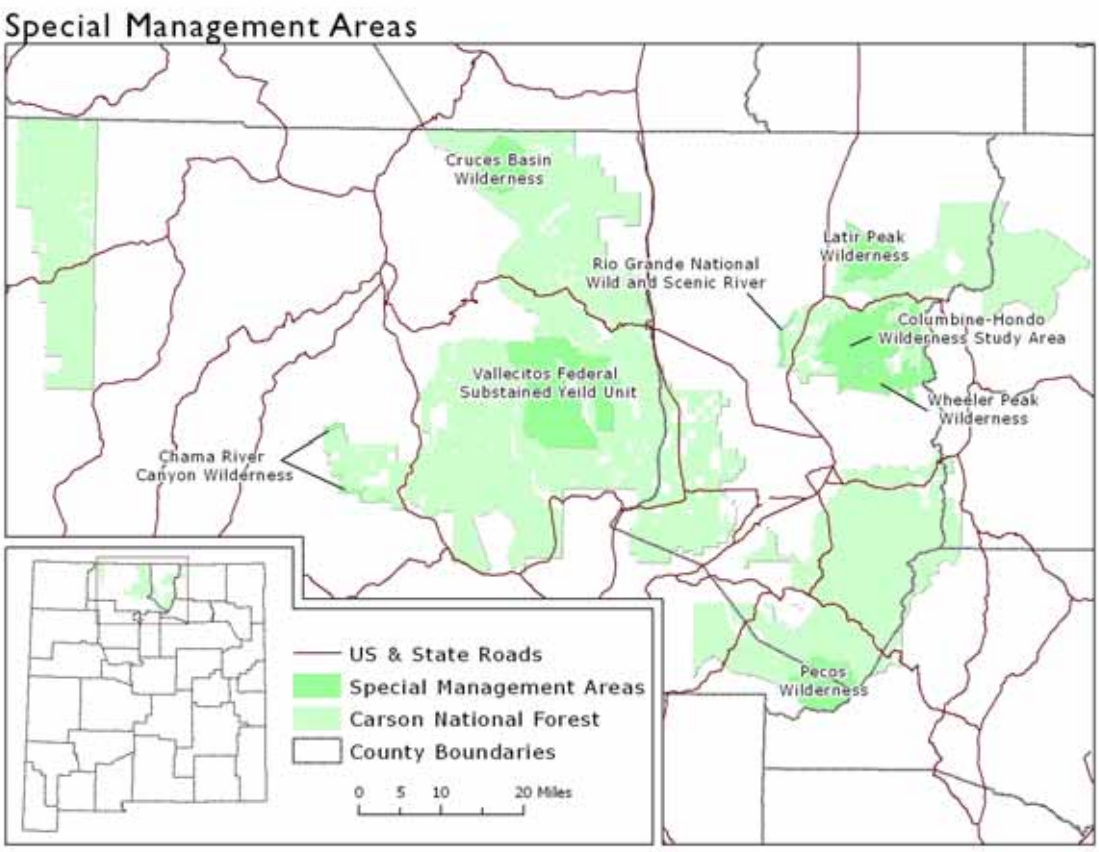

Figure 6.1: Special Management Areas on The Carson NF

6.1 Recreational Sites

The Carson NF features over 80 designated recreational sites. For a complete list of recreational sites, please see **Table A.4** in the appendix. **Table 6.1** lists the number of designated recreation sites in each district, according to the INFRA database. The Questa RD has the most recreational sites with 35 out of 81. The district also has two of the three ski areas, which attracts the most visitors. Other common sites are developed campgrounds (28) and trailheads (27).

Table 6.1: Recreation Site Type in The Carson NF

Designated Site Category	Number of Sites					
	Tres Piedras	El Rito	Questa	Camino Real	Unknown	Total
Picnic Site	1	0	2	3	3	9
Campground	3	1	14	8	2	28
Interpretive Site (Major)	0	0	0	0	1	1
Trailhead	0	0	11	15	1	27
Camping Area	1	1	1	1	0	4
Day Use Area	0	0	1	1	0	2
Ski Area Alpine	0	0	2	1	0	3
Group Picnic Area	0	0	1	0	0	1
Other Winter Sports Site	0	0	2	1	0	3
Fishing Site	0	0	1	0	0	1
Interpretive Site (Minor)	0	0	0	1	0	1
Group Campground	0	0	0	1	0	1
TOTAL	**5**	**2**	**35**	**32**	**7**	**81**

Recreational sites are classified as either developed or dispersed sites. A developed site is a discrete place containing a concentration of facilities and services used to provide recreation opportunities to the public. Recreation sites are developed within different outdoor settings to facilitate desired recreational use. Developed sites include campgrounds, picnic areas, shooting ranges, visitor centers, and historic sites. Dispersed recreation are activities that occur outside of developed recreation sites such as boating, hunting, fishing, hiking, and biking. In other words, dispersed sites are popular areas that have no facilities or services. **Figure 6.2** shows the approximate location of developed and dispersed recreational sites in the Carson NF.[134]

[134] Data was obtained from USDA Forest Service INFRA database. The data was unclear as to which sites were developed and dispersed, so the map shows approximations.

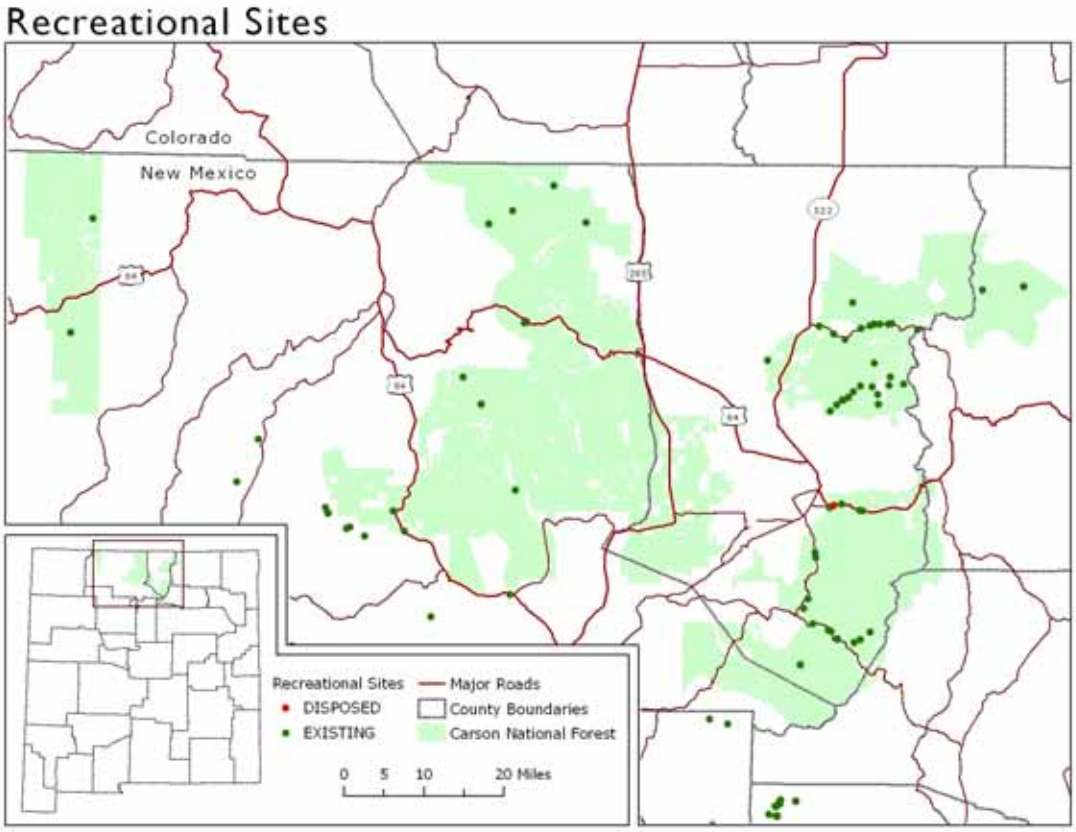

Figure 6.2: Designated Recreational Sites

6.2 Inventoried Roadless Areas and Wilderness Areas

In January 2001, the Clinton administration enacted the Roadless Area Conservation Rule ("The Roadless Rule"), closing off approximately 58.5 million acres of wild NF land to most commercial logging and road building.[135] In July 2004, the Bush administration announced a plan that would modify the Roadless Rule to create a petition process for governors who want to keep the areas protected or keep them open for various development endeavors. Generally speaking, universal protections for the IRAs are weakened.

Critics argue that the bureaucratic requirements involved in the petition process provide little incentive for governors to participate, which may result in the opening of IRA lands to commercial interests.[136] Supporters of the plan argue that roads allow access necessary for firefighters and offer additional recreational opportunities. Further, closing the areas off to development inhibits the economic viabilities for communities that depend on the forest for economic activity.

[135] NM PIRG Education Fund.
[136] Ibid.

While the policy revisions are applicable to the whole nation, the conflict is heated in New Mexico. The state has 1,102,000 acres of IRA (that do not allow road construction or reconstruction), making up about 12% of the NF System land in the state.[137] New Mexico Governor Bill Richardson, a member of Clinton's Cabinet, called the new plan "an abdication of federal responsibility" and a “partisan move just months before the presidential election.” Richardson said he will petition to protect "every single inch" of roadless areas in New Mexico.[138] The IRAs are a political hot button; an example of how forest users have interests that are often at odds with each other. The political struggle can be minimized by referring to it as a “passing issue;” one that may not be present in the future. While this may be true, it is nonetheless indicative of major land use conflicts occurring among forest users and various levels of governments, which may be of concern for years to come. See **Figure 6.3** for a depiction of IRAs in the Carson NF.

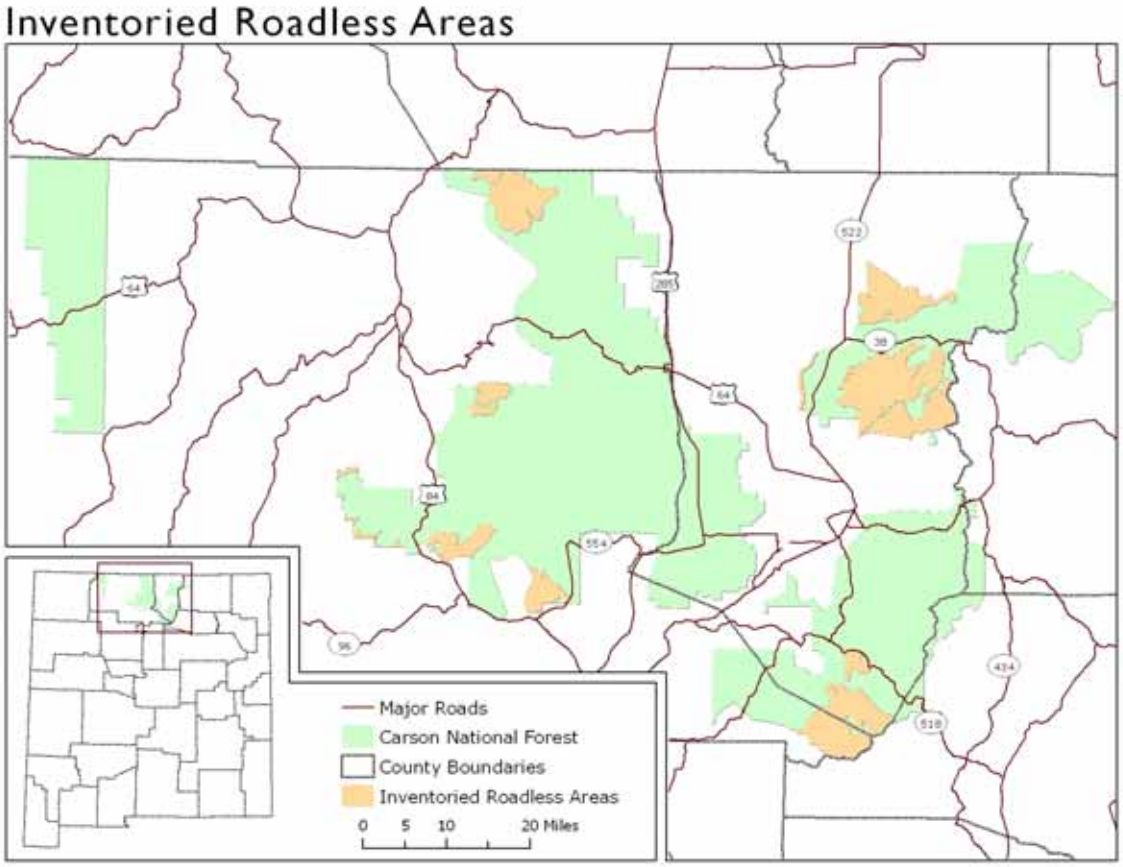

Figure 6.3: Inventoried Roadless Areas on The Carson NF

The map shows that much of the roadless areas are in designated wilderness areas, such as the Cruces Basin in the north-central region and the Wheeler Peak Wilderness in the eastern region.

[137] USDA Forest Service map of NM Inventoried Roadless Areas on NF lands.
[138] Juliet Eilperin, “Roadless Rules for Forests Set Aside: USDA Plans to Reverse Clinton Prohibitions,” *Washington Post*, July 13, 2004, A1.

According to the FS, the Carson NF has 57,000 acres that are designated roadless and does not allow for road construction and reconstruction.[139]

Wilderness is another special management designation, used to characterized areas where humans are only guests and the areas are generally unfettered by human development. Nationwide, wilderness areas were established through the Wilderness Act of 1964. The Act describes wilderness as *"an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."* [140] According to the FS, the areas are part of a system of wild lands that contribute significantly to the ecological, educational, and social health of its users and surrounding communities. Wilderness provides clean air and water, a shelter for endangered species, sacred places for indigenous peoples, and a living laboratory for research. Beyond community benefits, the wilderness areas provide individual resources, such as an opportunity to explore personal values while experiencing risk, reward, and self-reliance.[141]

Within the Carson NF are 86,193 acres of wilderness. Wilderness is a formal designation, introducing restrictions such as: no mechanized travel (including bicycles) and no camping within 300 feet of wilderness lakes. The wilderness areas are: Wheeler Peak, Latir Peak, Cruces Basin and parts of the Chama River and Pecos Wilderness areas.

In addition to the IRAs and designated Wilderness areas, the Carson NF features a wild and scenic river. In 1968, Congress passed the National Wild and Scenic River Act, providing to protect certain rivers to remain in their natural state. Of the initially eight wild and scenic rivers, one lay in New Mexico, the Upper Rio Grande. The designated area begins at the Colorado border, this section of the river flows south through rugged country, skirting the Carson NF and the Pueblo de Taos Reservation for almost 50 miles to the town of Taos. This stretch of water adds to the recreational attractions offered by the facilities of the Carson NF, Wheeler Peak and the ski and hiking properties of the Red River resort.

As eluded to in previous sections, special management areas are invaluable to the FS and the forest users. They provide opportunities such as wildlife watching, exploration and retreating from daily life. These areas offer “unspoilt” landscapes and environments, treasured by forest users. The Valle Vidal Unit is the quintessential example of a multiple-use special management area. The next section details management and multiple use issues concerning the Valle Vidal Unit. While the discussion is specific to issues of a certain time, the unit is an integral part of the forest and discussions surrounding its use will carry on well into the future.

6.3 Forest-Specific Issues: The Valle Vidal Unit

Pennzoil gave the Valle Vidal Unit to the American people in 1982. The Valle Vidal is an area featuring abundant wildlife, including mule deer, black bear, mountain lion, wild turkeys, and native Rio Grande Cutthroat Trout. The area is also known for the state’s premier elk herds, which live in the vast alpine meadows. In 2002, the Carson NF received a request from El Paso

[139] A Forest Service map of Inventoried Roadless Areas is available at http://roadless.fs.fed.us/states/nm/cars.pdf.
[140] The Wilderness Society, *The Wilderness Act of 1964.* http://www.wilderness.org/OurIssues/Wilderness/act.cfm.
[141] Ibid.

Corporation to lease approximately 40,000 acres of the Valle Vidal for natural gas development.[142] Before the Carson NF can consent to the lease, a Land Management Plan amendment and leasing analysis must be completed. The Land Management Plan amendment process began in 2005 and should be completed some time in 2007.

To the east of the unit is Vermejo Park Ranch. The El Paso Corporation plans to drill 25 new wells along the northeast edge of Vermejo Park Ranch, just across the ridge from the Valle Vidal. Further, the company is still requesting the FS to open the 40,000-acre eastern half of the unit for natural gas development. The company has consistently insisted that it can drill in an environmentally sensitive way. However, political leaders and community representatives have advocated the protection of the area[143] with the Valle Vidal Protection Act of 2005. In November 2006, U.S. Senator Pete Domenici announced his support for the bill, thereby constituting a congressional delegation unified in preventing development in the area.[144] Some argue that the decision to close the area to development is being guided by politics rather than sound scientific research and should have been made after the FS releases its Management Plan.

The effort to close the area to oil and gas development is led by the Coalition for the Valle Vidal.[145] The coalition is made up of sportsmen, ranchers, outfitters and guides, local businesses, elected officials, concerned citizens, outdoor enthusiasts, and conservation groups. The broad-based nature of the Coalition reflects a diverse spectrum of interests the have united in opposition to developing the Valle Vidal. Interests that have been historically in opposition, such as hunters and wildlife preservationists, are now bedfellows in an effort to keep the area from being developed.

The possibility of developing the Unit has stakeholders investigating development's potential effects on the local economies, communities and the natural environment. A study predicting the local economic impacts of natural gas development in the Valle Vidal region concludes that the committing the land to commercial mineral development will not bring real economic development to Colfax County. Some research shows that the area will be "condemned" to a "boom, bust and systematic decline that characterizes other mineral-dependent regions."[146] Beyond economic considerations, some, including former NM Attorney General Patricia Madrid, have expressed opposition to oil and gas development because of the area's ecological and social significance to the people of New Mexico. Further, the State of New Mexico Environment Department is concerned about adverse impacts of oil and gas exploration on surface water quality, non-point surface pollution and ground water quality.[147]

[142] Reese, A. (2006). "Company's Plans to Drill Near Contested Lands in NM Provokes Backlash," Spotlight, Vol. 10 (9).
[143] Coleman, M. "Udall Wants Ban on Mineral Extraction in Popular Valle Vidal Recreation Area," *Albuquerque Journal*, October 28, 2005.
[144] The Associated Press. "Domenici Joins Rest of NM Delegation on Valle Vidal Bill," November 17, 2006.
[145] See, http://www.vallevidal.org/.
[146] Power, M. (2004). The Local Economic Impacts of Natural Gas Development in Valle Vidal, New Mexico.
[147] Ibid.

In addition to the concerns raised by state agencies and public officials, an analysis of public comments showed the vast majority of people who wrote letters to the FS expressed the desire to protect the Valle Vidal from development (97% of 54,029 letters).[148]

The Valle Vidal Unit is an undeniable force in the socio-economic vitality in northern New Mexico. Whether the area is developed for natural gas extraction or not has caught the attention of residents and political leaders from all around the state and the rest of the nation. It is a prime example of the interactions between the FS, other federal entities, political leaders, private interests, and forest users all jockeying for what they believe to be the best use of land. While this issue may be resolved in 2007, one can expect to hear more about the Valle Vidal and other special management areas in the future.

6.4 Tribal and Ceremonial Areas

Northern NM is characterized by the presence of tribal lands, including reservations and pueblos. However, tribes have historically used land inside and outside these formal designations. Much of the forest encompasses or abuts areas that were inhabited by native tribes for hundreds of years. Research with northern New Mexico tribes has described the areas including and surrounding forest boundaries are part of the tribes' "homeland."[149] The concept of Homeland, as used by tribal groups, can be described as the interaction of tribal association with traditional lands, history, and culture. While homeland identifies a specific geographic locality that can be seen on a map, homeland also describes contemporary tribes and their long-standing connections to their ancestors and history.[150] The tribal homeland existed long before formal designations such as "Indian Territory" or "Reservation," came into play, although there is some overlap. Homeland extends across formal boundaries and includes qualitative understanding about the connections of place, culture and ways of life that links past and future generations.

While these considerations are no doubt broad and vague, they are of the utmost importance to the tribal groups and their way of life. For these locales, the identity and other information are kept secret to honor the privacy of tribal activities and uses. Information is not provided to visitors on brochures or maps, nor is it shared freely among local communities. However, the FS does maintain information on areas such as "heritage resources," which often include these special areas. The low-profile of sacred areas poses a unique problem to the FS, as it prevents them from knowing which areas are considered sacred. For instance, imagine a hypothetical situation where a proposed road intersects an area of cultural import, but the tribe does not wish to comment because the site would then be identified. Management approaches to protecting cultural sites may be counter-productive because they have the potential to identify sites.[151] Further, the various tribes have different areas which they use for ceremonial and cultural purposes. One tribal group may think FS management in the area is a great idea while another

[148] Hughes, T. (2006). Quantitative Analyses of Public Comment Submitted During the Scoping Phase of the Proposed Forest Plan Amendment for the Valle Vidal.
[149] Russell, J. and Peggy Adams-Russel, P. (1995) Attitudes, Values and Beliefs toward National Foest Service Land: The NM Tribal People. USDA Forest Service.
[150] Ibid. p. 31.
[151] Ibid.

tribe wants the area completely protected.[152] The implication is that the FS would have to consult with each tribe individually on management decisions.

The tribes' long-term association with the landscape has resulted in the accumulation of knowledge about ecological processes, weather and the relationships of humans to the landscape. This accumulated traditional knowledge is perceived to be undervalued and misunderstood by the FS, and there is a desire to foster appreciation and use of this information in future management and decision-making.

6.5 Challenges and Opportunities for Forest Management

The Forest Service maintains special areas in the forest that offer unique opportunities for visitors, traditional forest users and wildlife. The key issues concerning special management areas are similar to those presented in Chapter 5. The FS is in the difficult position of mediating different, often opposing, perspectives on what is the best and most appropriate use of land. In basic terms, one can see the line drawn between supporters of the FS's old mission, which was to extract economically viable resources from the forests and the more contemporary mission: conserve and protect the forest for generations to come. In some cases, like the Valle Vidal, the disagreements often grow into something bigger than just a land use decision. Rather, it becomes a symbolic rallying point for the forest's various stakeholders, making the FS's duties even more difficult.

With growing population pressures and increasing conflicts between government bureaucracy and forest users, the management of special areas promises to become more complicated. As stated in the Wilderness Act of 1964, *...increasing population, accompanied by expanding settlement and growing mechanization,"* [the Act helps to] *"secure for the American people of present and future generations the benefits of an enduring resource of wilderness."*

Opportunities exist for the FS in regards of managing special areas. The substantial public response to forest management issues demonstrates that various stakeholders are deeply invested in land use decisions and look to the FS for support. Here again, the FS has the opportunity to demonstrate its mission, facilitate discussion and create collaborative relationships among different stakeholders. The tribal groups in the area pose a special management opportunity.

Northern New Mexico is home to many tribal groups, each representing a potential source of knowledge and management assistance, which can be of tremendous benefit to the FS. Russell's study on the northern tribes revealed a willingness among tribal members to be involved in forest management and decision-making processes. The FS has the opportunity to directly address tribal interests in management decisions by delegating some of the management responsibilities to the tribes.

In terms of further developing forest land, such as road construction, the FS has the opportunity to increase visitor access to the forest and maintain adequate access routes for emergency personnel. In many cases, allowing development can possibly increase much needed economic activity in rural areas, as in the case of mineral extraction. Again, the difficulty lies in balancing land use among a broad spectrum of stakeholders.

[152] Ibid p.30.

Special areas pose many risks and challenges to the FS as well. In regards to recreational sites, maintaining them requires significant amounts of labor and other resources that may not be available to the FS. In the past, the agency has addressed this issue with the use of volunteers.

The FS is often caught in the middle of decision making at the federal level (such as the Roadless Rule) and demands from users at the local level. If locals perceive the federal government as interfering with New Mexico land issues, the FS can be accused of being influenced by "Washington" and not being sensitive to the cultural and ecological contexts of open space in New Mexico. Any decision the FS makes runs the risk of upsetting another group of stakeholders.

When working with tribal groups, the FS is in a complicated situation. As described earlier, there are about ten tribal groups surrounding the Carson NF. To each of these groups, the land is the nexus of history, way of life, culture and future generations. Special areas are used for religious and cultural purposes, and these places are not always known by the FS. This complicates forest management because the agency runs the risk of implementing projects on ceremonial land without knowing it. Further, the tribes all use different special areas. One tribe may give the go ahead to clear trees from one area, when another tribe uses it for ritual practices. The only way to be completely sure is to survey all the tribes individually. The FS works to preserve the integrity of tribal special areas, but it becomes very difficult when they do not know where they are.

7 Economic Impacts

7.1 The Carson National Forest Regional Economy

Carson National Forest (NF) generates economic activity from a variety of uses, each of which affects the surrounding region in a number of ways. Carson NF lies mainly within Taos and Rio Arriba Counties, with just a small portion in Mora and Colfax Counties. The principal settlements in the region include Española in Rio Arriba County and Taos in Taos County, though Española is somewhat south of the forest itself. Colfax County contains Springer and Raton, both a significant distance east of the Carson NF. Mora County contains Mora, which is much closer but very small. Further, the economies of Taos and Rio Arriba Counties are much larger than those of Colfax and Mora Counties, and account for 77 percent of the employment in the four county area. Since Carson NF land lies mainly in Taos and Rio Arriba Counties, and the economies of these two counties are significantly larger than Colfax and Mora Counties, the economic contribution of the NF is generally associated with activities in these two counties.

Table 7.1 shows employment and per capita income for the Carson NF region for the year 2003. As a whole, per capita income in the Carson NF assessment area is $21,045, about two-thirds the statewide average but well above average for most rural areas in New Mexico[153]. Rio Arriba and Taos Counties' economies are among the largest in New Mexico, with pockets of relative wealth scattered among mainly rural, low and middle income communities. Colfax County, though smaller than Taos and Rio Arriba Counties, has the highest per capita income of the region, at $22,496. Mora County, by contrast, is the poorest county in the region and among the poorer counties in the state, with a per capita income of only $15,867.

Table 7.1 Total Employment and Income by County, 2003

	Employment (#)	Percent of Region	Per Capita Income ($)	Relative to US
Colfax County	8,469	19%	22,496	0.71
Mora County	2,016	4%	15,867	0.50
Rio Arriba County	17,535	39%	20,720	0.66
Taos County	17,267	38%	21,694	0.69
Carson Region	45,287	100%	21,045	0.67
New Mexico	1,015,365	--	24,892	0.79
United States	167,488,500	--	31,484	1.00

Source: Bureau of Economic Analysis, 2003

Table 7.2 shows the industrial composition of employment in each county for the years 1980, 1990 and 2000. In general and as in most parts of the U.S. and New Mexico, changes in the industrial structure of the region involve a relative increase of employment in the service sector and retail sectors and, during the 1990s, in the construction sector. All counties saw a decline in shares of farm employment. The principal distinction among the counties was regard to the role of the public sector.

Mora County, with the smallest economy in the region, is distinguished among the four counties as the most rural, with a far higher share of farm employment. Yet, the changes in the composition of employment in the county were also most pronounced among the four counties. In particular, services increased 15 percent during the 1980-2000 period, from only 8 percent to 23

[153] New Mexico's statewide average is pushed up significantly by relatively high incomes in urban areas, particularly in Albuquerque, Santa Fe and Los Alamos. Few rural counties have incomes above $17,500 per person.

percent of total employment. Conversely, the farm sector and government employment, which together accounted for 69 percent of total employment in 1980, declined sharply in relative shares, to 52 percent in 2000.

Colfax County's industrial structure was fairly stable from 1980 to 2000. There were small increases in the relative size of services[154], retail and government, particularly in state government, and corresponding decreases in farming, manufacturing, and wholesale trade. Growth of the construction sector during the period between 1990-2000 reflects residential development in Angel Fire and Eagle's Nest. The closing of coal mines in Colfax County is not reflected in the 2003 data, but likely had adverse effect on the counties' economic activity.

Employment in Rio Arriba County nearly doubled between 1980 and 2000, driven mainly by the very rapid expansion of the service sector and retail trade sectors. Other sectors grew more slowly, except for the small wholesale trade sector which saw a small decline. In terms of employment composition, as in Mora County, farm and government employment fell sharply in Rio Arriba County.

Taos County followed a similar pattern, albeit from a starting point that was less farm based and already more characteristic of tourism. Services grew very rapidly, along with the retail and construction sectors. By contrast, farm and government sectors continued to lose employment shares. To a lesser extent, employment shares in manufacturing, mining, and transportation and utilities also fell.

Table 7.2 Employment in Primary Sectors by County in 1980, 1990, and 2000

Mora	1980	1990	2000	1980%	1990%	2000%	Growth 1980-1990	Growth 1990-2000
TOTAL	1,061	1,120	1,767	100%	100%	100%	6%	58%
Farm Employment	**407**	**429**	**515**	**38%**	**38%**	**29%**	**5%**	**20%**
Non-farm Employment	**654**	**691**	**1,252**	**62%**	**62%**	**71%**	**6%**	**81%**
Private Employment	**324**	**380**	**853**	**31%**	**34%**	**48%**	**17%**	**124%**
Agricultural services, forestry, and fishing	(D)	35	76	(D)	3%	(D)	(D)	117%
Mining	(L)	(D)	(L)	(L)	(D)	(L)	(D)	(D)
Construction	37	43	93	3%	4%	(D)	16%	116%
Manufacturing	(D)	36	(D)	(D)	3%	(D)	(D)	(D)
Transportation and utilities	46	63	102	4%	6%	6%	37%	62%
Wholesale trade	12	(L)	(D)	1%	(L)	(D)	(D)	(D)
Retail trade	116	68	112	11%	6%	6%	-41%	65%
Services	86	120	405	8%	11%	23%	40%	238%
Government and gov't enterprises	**330**	**311**	**399**	**31%**	**28%**	**23%**	**-6%**	**28%**
Federal, civilian	41	39	46	4%	3%	3%	-5%	18%
Military	19	22	17	2%	2%	1%	16%	-23%
State and local	270	250	336	25%	22%	19%	-7%	34%
State government	68	56	58	6%	5%	3%	-18%	4%
Local government	202	194	278	19%	17%	16%	-4%	43%

[154] Data for 2000 have been supressed by the BEA to avoid disclosing information specific to individual businesses. (D) in the tables indicates 'Disclosure'.

Colfax	1980	1990	2000	1980%	1990%	2000%	Growth 1980 1990	Growth 1990 2000
TOTAL	6,674	6,534	8,465	100%	100%	100%	-2%	30%
Farm Employment	**502**	**434**	**499**	**8%**	**7%**	**6%**	**-14%**	**15%**
Non-farm Employment	**6,172**	**6,100**	**7,966**	**92%**	**93%**	**94%**	**-1%**	**31%**
Private Employment	**5,058**	**4,807**	**6,376**	**76%**	**74%**	**75%**	**-5%**	**33%**
Agricultural services, forestry, and fishing	52	82	(D)	1%	1%	(D)	58%	(D)
Mining	551	208	(D)	8%	3%	(D)	-62%	(D)
Construction	382	313	477	6%	5%	6%	-18%	52%
Manufacturing	404	362	409	6%	6%	5%	-10%	13%
Transportation and utilities	254	287	263	4%	4%	3%	13%	-8%
Wholesale trade	130	94	95	2%	1%	1%	-28%	1%
Retail trade	1160	1184	1,654	17%	18%	20%	2%	40%
Services	2,125	2,277	(D)	32%	35%	(D)	7%	(D)
Government and gov't enterprises	**1,114**	**1,293**	**1,590**	**17%**	**20%**	**19%**	**16%**	**23%**
Federal, civilian	55	58	64	1%	1%	1%	5%	10%
Military	63	65	47	1%	1%	1%	3%	-28%
State and local	996	1170	1,479	15%	18%	17%	17%	26%
State government	408	544	736	6%	8%	9%	33%	35%
Local government	588	626	743	9%	10%	9%	6%	19%

Rio Arriba	1980	1990	2000	1980%	1990%	2000%	Growth 1980 1990	Growth 1990 2000
TOTAL	8,387	11,088	15,537	100%	100%	100%	32%	40%
Farm Employment	**874**	**986**	**1,059**	**10%**	**9%**	**7%**	**13%**	**7%**
Non-farm Employment	**7,513**	**10,102**	**14,478**	**90%**	**91%**	**93%**	**34%**	**43%**
Private Employment	**4,252**	**6,526**	**9,821**	**51%**	**59%**	**63%**	**53%**	**50%**
Agricultural services, forestry, and fishing	116	114	192	1%	1%	1%	-2%	68%
Mining	48	68	78	1%	1%	1%	42%	15%
Construction	464	677	953	6%	6%	6%	46%	41%
Manufacturing	256	507	648	3%	5%	4%	98%	28%
Transportation and utilities	346	518	528	4%	5%	3%	50%	2%
Wholesale trade	117	199	209	1%	2%	1%	70%	5%
Retail trade	1,240	1,563	2,484	15%	14%	16%	26%	59%
Services	1,377	2,532	4,153	16%	23%	27%	84%	64%
Government and gov't enterprises	**3,261**	**3,576**	**4,657**	**39%**	**32%**	**30%**	**10%**	**30%**
Federal, civilian	350	406	416	4%	4%	3%	16%	2%
Military	135	175	136	2%	2%	1%	30%	-22%
State and local	2,776	2,995	4,105	33%	27%	26%	8%	37%
State government	860	678	850	10%	6%	5%	-21%	25%
Local government	1,916	2,317	3,255	23%	21%	21%	21%	40%

Taos	1980	1990	2000	1980%	1990%	2000%	Growth 1980 1990	Growth 1990 2000
TOTAL	8,351	11,434	15,918	100%	100%	100%	37%	39%
Farm Employment	**432**	**472**	**494**	**5%**	**4%**	**3%**	**9%**	**5%**
Non-farm Employment	**7,919**	**10,962**	**15,424**	**95%**	**96%**	**97%**	**38%**	**41%**
Private Employment	**6,355**	**9,402**	**13,173**	**76%**	**82%**	**83%**	**48%**	**40%**
Agricultural services, forestry, and fishing	46	124	188	1%	1%	1%	170%	52%
Mining	737	362	271	9%	3%	2%	-51%	-25%
Construction	519	780	1,330	6%	7%	8%	50%	71%
Manufacturing	440	594	410	5%	5%	3%	35%	-31%
Transportation and utilities	207	333	363	2%	3%	2%	61%	9%
Wholesale trade	86	218	226	1%	2%	1%	153%	4%
Retail trade	1,563	2,379	3,310	19%	21%	21%	52%	39%
Services	2,400	4,005	5,944	29%	35%	37%	67%	48%
Government and gov't enterprises	**1,564**	**1,560**	**2,251**	**19%**	**14%**	**14%**	**0%**	**44%**
Federal, civilian	295	318	312	4%	3%	2%	8%	-2%
Military	91	118	99	1%	1%	1%	30%	-16%
State and local	1,178	1,124	1,840	14%	10%	12%	-5%	64%
State government	206	147	365	2%	1%	2%	-29%	148%
Local government	972	977	1,475	12%	9%	9%	1%	51%

Notes: (D) Non-disclosure of confidential information, but included in totals, (L) Less than 10 jobs, and (N) Data not available for this year.
Source: Bureau of Economic Analysis

To complete the picture, **Table 7.3** shows private employment by percent of occupation for each county and the region as a whole. The occupation data supports the data from previous tables, showing a large percent of jobs in management, sales and services occupations, with construction representing a substantial portion as well. Differences in the total employment between **Table 7.2** and **Table 7.3** are due principally to the inclusion of self-employment in the BEA data.

Table 7.3 Private Employment by Occupation by County, 2000

	Colfax County	Mora County	Rio Arriba County	Taos County	Carson Region
Management and Professional	30%	28%	30%	32%	24%
Professional and related	16%	19%	19%	20%	15%
Education, training, and library	7%	8%	7%	6%	5%
Healthcare practitioners and technical	4%	2%	2%	3%	2%
Service	19%	22%	21%	22%	17%
Sales and office	22%	18%	25%	25%	19%
Farming, fishing, and forestry	3%	6%	2%	1%	1%
Construction, extraction, and maintenance	14%	17%	13%	13%	10%
Production and transportation	12%	8%	9%	7%	7%
Total Private Employment	**6,045**	**1,686**	**16,563**	**13,556**	**48,673**

Source: US Census 2000. Calculations by UNM-BBER.

Finally, **Table 7.4** shows the unemployment rates for each of the counties and the region as a whole from 1995 to 2004. The most striking trend in these data is the much higher unemployment rates of Mora County when compared with the other three counties in the region. While unemployment in all counties in the region is consistently higher than the New Mexico average, Colfax, Rio Arriba, and Taos County are only slightly higher, while unemployment in Mora County is significantly higher.

Table 7.4 Average Annual Unemployment Rate by County 1995-2004

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Colfax County	12.8	9.3	6.7	6.1	5.5	5.2	5	6.2	5.7	5.4
Mora County	24.1	21.4	20.4	18.6	14.8	10.5	9.6	10.6	11.1	11.7
Rio Arriba County	14	12.9	10.4	7.7	6.6	5.7	6	6.5	6.4	6.2
Taos County	15.8	14.5	13	9	10.2	6.3	6.4	6.4	7	6.4
Carson Region	**16.7**	**14.5**	**12.6**	**10.4**	**9.3**	**6.9**	**6.8**	**7.4**	**7.6**	**7.4**
NM TOTAL	**6.4**	**7.4**	**7.1**	**6.3**	**6**	**5.2**	**4.8**	**5.2**	**5.8**	**5.9**

Source: Bureau of Labor Statistics, Local Area Unemployment Statistics (LAUS).

The data presented in this section show a region that is substantially oriented toward retail and service industries, though Mora County is an exception to this. As such, the most important aspect of Carson NF use is the revenues generated by recreational visitors. This is not to neglect the primary industrial uses of the forest land, but the main economic concerns of the region with respect to the forest are likely oriented toward maintaining or extending recreational use. This is particularly true for ski visitors, who make up a substantial portion of recreation and, at least in Taos County, are a very important source of revenue during the otherwise non-tourist winter season. One additional aspect discussed in Chapter 5: Uses and Users is that a number of region residents make use of forest food and fuel products to supplement low incomes and provide heat throughout the winter.

7.2 Methodology and Organization of Impact Analysis

In estimating the contribution of the Carson NF to the regional economy, we consider both the operations of the FS in the region as well as the various uses of forest related products. The IMPLAN software is used to determine total economic value of each activity and the operations of the FS. IMPLAN uses county-level input-output (I-O) data to determine the extent to which these activities contribute to the local economy. In doing so, IMPLAN distinguishes between direct, indirect, and induced impacts, where:

> **Direct impacts** include the economic value generated by the activity itself, such as the value of cattle grazed on Carson NF land.
>
> **Indirect impacts** include the value generated by purchases to support that activity and the corresponding purchases to support those activities, in perpetuity. For example, indirect impacts would include the value of fencing purchased for ranching, the value of steel purchased to make the fencing, and so on.
>
> **Induced impacts** capture the value of economic activity generated from spending by employees that produce the direct and indirect goods. The ranch employees will purchase food, pay for electricity, etc…all of which generates additional value from the purchases, as well as sparking new rounds of indirect and induced value.

The IMPLAN region is the same region used throughout this report, consisting of the four counties containing or bordering any of the Carson NF districts. These counties include: Colfax, Mora, Rio Arriba, and Taos County. This single region, containing the above four counties, makes up the area considered as "local," and the results shown from IMPLAN are for this region of four counties as a whole.

As discussed in *Chapter 5: Uses and Users*, the principal economic value generating activities related to the forest land itself include ranching, and recreation and wildlife visits. Oil and gas production also generates high economic value in the region, but the impacts of this activity on the local region are limited. For each activity, we estimate the direct impact, and use IMPLAN to estimate the total economic value by direct, indirect, and induced impacts. The FS is unique in that it does not directly produce a good or service, and so there is no easy measure of its direct economic value. Instead, we look at FS expenditures and salaries and wages to estimate the first round of indirect and induced impacts of the FS, and the corresponding economic activity generated by each. The indirect activity is captured by FS expenditures, and the induced activity is captured by the disposable income of FS employees. Of course, in examining the contribution of the FS, we also consider direct employment by the FS.

This analysis draws on a wide range of data and information sources. Data on the structure of the local economies and characteristics of the workforce comes largely from the 2000 Decennial Census Summary File 3 and US Department of Labor Local Area Unemployment Statistics (LAUS). The FS provided data on the specific activities that occurred on the forest. Specific sources included INFRA (grazing); NVUM (recreation and wildlife); Region 3 Office (procurement, wages & salaries). The US Department of Agriculture National Agricultural Statistics Service (NASS) was the source of data on agricultural land values and cattle stocking rates. Oil and gas production values are from the ONGARD database provided by the Oil Conservation Division at the New Mexico Energy, Minerals and Natural Resources Department

and the New Mexico Taxation and Revenue Department, while oil and gas prices are from GO-TECH at New Mexico Institute of Mining and Technology.

7.3 Direct Impact of Carson National Forest on the Regional Economy

The principal economic activities on the Carson NF include ranching, timber harvests, recreation and wildlife visits, and the operation activities of the FS. As mentioned above, oil and gas extraction generates a large volume of output, the benefits of which for the most part do not accrue to the local region (this is discussed further below). Some of these activities are quite large economically, though their benefit to the local region can vary substantially. Additionally, there is considerable economic activity in terms of guided trips, including hunting tours, whitewater rafting, horseback riding vacations, and other luxury recreational activities that are either not captured in the recreational data used here, or are likely to be substantially underrepresented. In such cases we attempt to address major contributions individually.

To maintain consistency, data for 2004 was used wherever possible. Where 2004 data is not available, or more recent data is available, we used that instead, making sure to adjust values back to 2004. Data for FS salaries and wages is from fiscal year 2005 adjusted to 2004 dollars. Data on grazing land is from 2002. Visitor estimations are derived from the 2003 NVUM survey. All other data is from 2004 unless noted.

The FS provided data on cattle grazing from the INFRA database in terms of Animal Unit Months (AUMs), and we estimated the number of employees needed per AUM. Together these values provide an estimated number of employees needed to produce the 2002 AUMs. Using the IMPLAN value for output per employee, we derive a ranching output for grazing on the Carson NF. This is the direct value of ranching on Carson NF land. Similarly, timber harvesting data was derived from the TIMS database provided by the FS. We use 2004 timber prices to derive the total value of timber cut, which measures the direct value of timber harvested in Carson NF in 2004.

Oil and gas production values come from the Oil Conservation Division of the New Mexico Energy, Minerals and Natural Resources Department. The data list production for 2004 and the geographic location of each well, so we were able to match well locations to find those wells located on Carson NF land. Using 2004 oil and gas prices gives us a market value for the production on forest land. Rock and mineral extraction data was provided by the FS and the market value of the production was calculated using an average of prices from relevant surveyed New Mexico businesses.

For recreation and wildlife visitors, we use estimates of visitors from NVUM data provided by the FS, broken out into several categories based on locality (local or non-local), the type of trip (day, overnight on the forest, overnight off the forest), and the reason for the visit (recreation or wildlife). The FS provided an average expenditure profile for each type of visitor, which estimates the direct economic value of visitor spending to the local economy. It is likely that there are several benefits here that are not captured. Many of additional benefits of a forest in terms of recreation are not economic transactions and hence cannot be easily measured. In addition to these unmeasured benefits, there is some degree of outfitter and guide activity that is likely not captured. The outfitter businesses include guided hunting trips, whitewater rafting on the Carson

River, and other specialized uses by private companies. The impacts from this segment are small, but can be important, since the customers are almost exclusively non-local and the trips can be quite expensive.

Finally, the FS provided data on salaries and wages for Carson NF employees and other direct expenditures. Since the direct economic value associated with the FS personnel expenditures is unknown, we use expenditures to capture the first round indirect impacts and salaries and wages to capture the first round induced impacts. In both cases, the associated later round indirect and induced impacts are calculated by the IMPLAN model.

Table 7.5 is a summary of the output, employment and labor incomes directly associated with Carson NF-based activities[155]. These are the direct inputs to the IMPLAN model. As the table shows, there is the equivalent of 112 full-time annual jobs in the ranching industry and a similar 15 jobs in harvesting lumber from the Carson NF. In the case of FS operations, employment is the number of employees directly employed by the FS in the Carson NF, and labor income is the wages paid to those employees. Output for the FS is actually FS spending on operations, and does not include the costs of fighting wildfires, which is broken out separately. Finally, while mineral and rock extraction data is available, its market value is quite low, estimated at less than $15,000 in 2004. There is negligible minerals extraction on Carson NF, so that is not considered as an impact here. For various reasons, the impacts of wildfire suppression, oil and gas extraction, and ski visitors activities on the local economy are likely overestimated by IMPLAN. These factors are considered in greater detail below, in section 7.4.

Table 7.5 Direct Inputs of the Carson NF, 2004 (000s of 2004 $, except employment)

	Output	Employment	Labor Income
Ranching[1]	**5,149**	**112**	**232**
Timber Harvesting	**2,232**	**15**	**274**
Oil & Gas	**163,122**	**2**	**204**
Visitors & Recreation	**159,835**	**	**
Skiers	**57,131**	**	**
Forest Service Operations[2]	**8,884**	**223**	**7,601**
Wildfire Suppression[2]	**687**	**	**805**

[1] For Ranching, we use proprietor income from 2001, since proprietor income for 2002 is negative

[2] Forest service operations output is actually the first round of indirect spending, while labor income is disposable employee income.

**It makes no sense to associate employment or labor income with visitor spending in the input phase, since there are no jobs until after the money has been spent. Since the impact is originating as consumer spending, there are only indirect/induced impacts, no direct effects except the spending.

Table 7.6 presents total employment and output for industrial sectors that may be affected by Carson NF. A comparison of the IMPLAN generated FS impact values with these data offers a measure of the dependence of local industries on Carson NF resources – to the extent that IMPLAN values comprise a large share of the overall level of activity for a sector, that sector can

[155] Labor income is the sum of employee compensation and proprietor income.

be said to depend on FS resources. In the case of ranching and timber harvesting, Carson NF contributes about $7.4 million in output and 127 jobs combined, equivalent to only about 7 percent of the total for the assessment area. FS operations and employment account for 223 jobs and $8.9 million in output, equivalent to a substantially larger share of federal non-military activities in the assessment area. Most significantly, recreation and tourism related activities associated with the Carson NF contribute about $160 million, accounting for a substantial share of such activities in the assessment area.

Table 7.6 Employment and Output for Select Industries by County, 2002

	Output	Employment
Carson NF Region	**2,495,898**	**35,575**
Cattle Ranching, Farming	**79,068**	**1,720**
Logging	**21,052**	**140**
Oil & Gas	**18,750**	**52**
Support Activities for Oil & Gas	**8,394**	**82**
Drilling Oil & Gas Wells	**2,792**	**26**
Gold, Silver and Other Metals Mining	**18,753**	**98**
Coal Mining	**50,035**	**180**
Sand, Stone and Gravel Quarrying	**942**	**11**
Hotels, Motels and Casinos	**52,003**	**1,076**
Food and Beverage Stores	**28,587**	**619**
Food Services and Drinking Places	**102,834**	**2793**
Federal Non-Military	**53,476**	**728**

Source: IMPLAN 2002 data, calculations by UNM-BBER. Percents do not sum to 100 because not all industries are included.

7.4 Economic Impacts and Multipliers

The direct activities associated with the Carson NF create indirect and induced impacts as businesses and workers make expenditures and purchases that cycle through the local economy. The sum of the direct, indirect, and induced expenditures constitutes the total impact of the Carson NF on the economies of the neighboring communities. These impacts, in terms of employment, income and total output, are summarized in **Table 7.7**. Economic multipliers, equal to the total impact divided by the direct impact, indicate the effectiveness of the industries to retain and recycle revenues locally, generating growth in the local economy. Economic multipliers are shown in **Table 7.8**.

In total, the Carson NF contributes directly and indirectly an estimated $414 million in output, 4,003 jobs and $89.3 million in income to the economies of the four counties included in this study. This is equivalent to nearly 9 percent of the 45,287[156] jobs in these areas in 2003. Visitor spending is by far the largest source of activity, contributing a total of 83 percent of the employment labor income impacts. The FS is the second largest contributor in terms of both employment and income. Oil and gas extraction contribute substantially to revenue generation,

[156] 2003 employment for the region as a whole from Table 7.1.

but have a marginal employment impact. Ranching is very much the opposite – it generates some employment and income but very little revenues. The impacts of timber harvesting are negligible in all regards.

Table 7.7 Direct, Indirect and Induced Impacts of the Carson NF, 2004

TOTAL OUTPUT IMPACTS (000s of 2002 $)

	Direct	Indirect	Induced	Total
Ranching	5,628	4,129	483	10,240
Timber Harvesting	2,234	990	199	3,423
Oil & Gas Extraction	163,086	19,069	806	182,961
Visitors & Recreation	147,525	26,610	25,230	199,365
Skiers	53,865	8,821	11,399	74,085
Forest Service Operations	--	10,836	6,312	17,148
Wildfire Suppression	--	394	478	871
Total	318,473	62,028	33,508	414,008

TOTAL EMPLOYMENT IMPACTS (#)

	Direct	Indirect	Induced	Total
Ranching	112	67	6	185
Timber Harvesting	15	9	3	27
Oil & Gas Extraction	1	52	10	63
Visitors & Recreation	2,695	303	333	3,331
Skiers	912	90	138	1,140
Forest Service Operations	223	85	82	390
Wildfire Suppression		3	4	7
Total	3,046	519	438	4,003

TOTAL LABOR INCOME IMPACTS (000s of 2002 $)

	Direct	Indirect	Induced	Total
Ranching	253	924	155	1,332
Timber Harvesting	247	187	58	492
Oil & Gas Extraction	108	1,959	253	2,320
Visitors & Recreation	55,169	7,627	8,072	70,868
Skiers	25,882	2,601	3,647	32,130
Forest Service Operations	8,308	3,179	1,983	13,470
Wildfire Suppression	440	127	218	785
Total	64,525	14,003	10,739	89,267

The comparatively large contribution of recreational and visitor spending is a direct result of the number of people visiting the Carson NF. More than one million individuals visited the Carson NF in 2003, which indicates a substantial level of use. We can see in **Table 7.7** that a large portion of the economic activity is due to skiing visitors.

In fiscal year 2004, FS spending on wildfire suppression in the Carson NF was about $1.74 million – $1.16 million in compensation and $687 thousand in spending. As shown in **Table 7.7**, wildfire related spending by the FS generated 14 jobs, $1.7 million in additional output, and $1.5 million in additional labor income. There are of course also the firefighter's jobs themselves, which are not included as they are largely not local.

Estimates for skiing, oil and gas, and fire suppression carry a high degree of uncertainty and rest on series of very specific assumptions. In the case of ski visitors, the difficulty is that it is not known the degree to which the impact of ski visitors is already captured in the visitors and recreation impacts shown in **Table 7.7**. Taos County includes Taos Ski Valley, Red River Ski Area, and Sipapu Resort, each of which generates a substantial number of visitors each winter. If one believes that the FS NVUM data accurately captures these visitors, than the impact of ski visitors should be considered a subset of the visitor and recreation impacts, and should not be added to the total impacts shown earlier. On the other hand, it is useful to see the impact of ski visitors as a separate category because downhill skier spending patterns are likely different from other recreational forest users, and because they may not be accurately counted in the NVUM data. This is especially true in the Carson NF region because skiing is such a large industry. In **Table 7.7** skiers are not included in the totals, as they are assumed to be included in the Visitors & Recreation data.

In the case of oil and gas, the region benefits from state and local governmental distributions in addition to the IMPLAN estimated impacts of extraction. Within Carson NF, oil and gas extraction occurs exclusively in the Jicarilla Ranger District, which lies in the Chama Municipality in Rio Arriba County. Using 2005 *ad velorum* tax rates, the tax benefit to Rio Arriba is estimated to be about $1.4 million (2004 $) – about $1 million to the County and $379 thousand to the Chama School District. In addition, in 2005 FS oil and gas-related disbursements amounted to almost $400,000 to the region's County governments. In total, these funds equal almost $2 million dollars in additional tax revenues to Rio Arriba County. Further, there are indirect and induced impacts that occur as the county governments spend these revenues. Finally, state taxes generate about $11.5 million in revenues from oil and gas extraction on Carson NF, though it is difficult estimate the share of this total that is returned by the State to the region through its expenditures. These public distributions are not included in **Table 7.7**.

For FS wildfire suppression spending, the pattern of expenditures by laborers is uncertain but has substantial implications. In this analysis, it is assumed that only half of the take home income of fire fighters is spent locally, as most work only temporarily in the area and their schedule entails the long periods of intensive work with little free time. With better estimates for the portion of income that is spent within the local region, it is a simple matter to share these impacts down to their appropriate amounts.

The economic multipliers listed in **Table 7.9** offer additional insights into the economic dynamics of the Carson NF. In particular, note the high labor income multipliers for ranching and wildfire suppression. In the case of ranching, this is due to the extremely low direct income generated per worker (only around $2,000) that is a result of very low proprietor income in the base year data. In the case of wildfire suppression, the high multiplier is caused by the large degree of indirect spending, which generates almost half of the total labor income impacts for that category, but which is not captured in estimates of direct labor income. The resulting multiplier is substantially higher simply because of the high expenditures of the FS when fighting wildfires. Many of the

other higher multipliers are an artifact of high output to employment ratios (in the case of oil and gas) or very low income to employment ratios (in the case of ranching and timber).

Table 7.8 Economic Multipliers for the Carson NF, 2004

	Output	Employment	Income
Ranching	**1.82**	**1.60**	**5.26**
Timber Harvesting	**1.53**	**1.76**	**1.99**
Oil & Gas	**1.12**	**57.18**	**21.40**
Visitors & Recreation	**1.35**	**1.24**	**1.28**
Skiers	**1.38**	**1.25**	**1.24**
Forest Service Operations	**--**	**1.75**	**1.62**
Wildfire Suppression	**--**	**--**	**1.78**

7.5 Challenges and Opportunities for Forest Management

Carson NF contributes substantially to the regional economy, accounting for nearly 9 percent of all employment in the four county assessment area. Visitor and recreational activities, including skiing, account for about 4 of 5 jobs and an equivalent share of labor income, and FS operations make up much of the remainder. Oil and gas extraction in Rio Arriba County generates revenues but little in the way in the way of employment and labor income. Despite their traditional significance, ranching and timber harvesting on the Carson NF make only a marginal contribution to the local economy.

Rio Arriba County contains almost 928,000 acres of the 1.58 million acres of the Carson NF. Carson NF land covers 25 percent of the entire county. With such a large piece of the NF land, Rio Arriba County captures majority of the economic contributions of the Carson NF, particularly among resource-based activities. Indeed, all active oil and gas wells in the Carson NF are located in Rio Arriba County, as well as a substantial volume of grazing and fuelwood harvesting.

Taos County contains almost 570,000 acres of Carson NF land, which covers 40 percent of the county's land area. With principal recreational assets located in the County, including Taos and Red River, Taos County captures substantial economic benefits for the NF. Additionally, the proximity of the NF and the amenities that it offers is attractive to developers and second home owners, generating additional activity not measured in this report.

Colfax and Mora Counties have only small slices of Carson NF land, and derive only marginal benefit from the use of forest land. Colfax County likely realizes some benefit from the proximity of the NF in developments in Angel Fire and Eagle's Nest, but this is very difficult to quantify. More direct activities, such as grazing and timber harvesting, are minimal in these Counties.

Oil & gas development has an uncertain economic impact, representing both opportunity and risk. The continuation of high prices are likely to heighten interest in exploration mainly in western Rio Arriba County and in the neighboring Jicarilla RD. Resource exploration and development typically generates the greatest number and the highest paying jobs, possibly to the benefit of the very low income communities on the Jicarilla Apache Reservation as well as communities in

central Rio Arriba County. Of course, the economic risk associated with oil & gas development is the volatility of economic cycles.

Apart from the specific areas where oil and gas exploration is possible, there is no reason to believe that the established trend away from resource-based activities such as grazing and timber harvesting and toward recreational uses will not continue.

Further, the assessment region will likely continue to attract second home buyers and retirees attracted by the beauty and amenities of the Carson NF. Economically, this portends continued growth of urban-based economic activities such as retail, service, hospitality, real estate and construction. These activities will continue to create jobs, though many will pay only low to moderate wages. Development will also require large investments in infrastructure, in many cases in areas that are difficult to access. The expansion of recreational uses and amenity-based development also will likely continue to drive up land prices, not only near already urbanized areas such as Taos, Red River, and Angel Fire, but increasingly in eastern and central Rio Arriba County. Tourism, recreational and amenity residential development are often characterized by highly volatile economic cycles – periods of rapid expansion followed by periods of declining investment, particularly in construction and real estate sectors. To be sure, volatility is not new to communities that have traditionally depended on resource development, whether in ranching, timber or mining. Yet, a significant difference is that rural economies in the region have been traditionally tied to the land and were able to balance multiple uses to soften the impacts of downswings in any given sector. Such opportunities are less available as the amenity-based economy continues to grow. High land values in the region discourage resource-based activities, particularly those that cross boundaries of public-private land. For example, grazing activities that provide supplemental income and food sources to rural communities typically combine the use of public land with private land to remain viable, but rising land values threaten these strategies.

Residential and amenity-based development along the boundaries of the NF also has implications for fire prevention. Residential development along forest boundaries both increases the likelihood of fire and the costs associated with fire fighting. These risks are especially high near many of the more remote areas of Carson NF, where fire fighting is especially problematic. The risks, of course, are not only economic, but there are concerns that are specifically economic in nature. Development increases concern for fire prevention, encouraging officials to limit access to the forest. This can have very substantial and adverse impacts on the regional economy, which increasingly depends on recreational opportunities that the NF offers.

Another risk facing the local economy concerns drought and global warming more generally. Dry conditions increase fire hazards and thus limit recreational opportunities on forest land. Further, dry winters mean less snow at the region's ski resorts, which are among the principal economic drivers in the area. The risk is not only short term and specific – that a dry winter will bring fewer skiers – but long term and general. Global warming will likely encourage resort developers to move north, where ski conditions are less at risk. As it is, Carson NF's ski areas are southern most along the Rockies and likely the first to be impacted by rising global temperatures.

Finally, the Carson NF plays a key role in terms of water generation and retention, which is vital to economic development in the arid southwest region. The factors that determine hydrological capacity of the forest are well beyond the scope of this study, but the economic implications cannot be overstated. Suffice to say, there are few economic activities discussed in this report or otherwise that could be sustained without the water that is so closely associated with Carson NF.

This is ultimately the most significant economic contribution and risk associated with forest management.

8 Community Relationships

This chapter describes the relationships between the Forest Service (FS) and other entities. The FS has an extensive history of working with local communities and other government agencies on various projects, ranging from economic development to forest health and sustainability. Partnerships are an indispensable method of managing operations and conducting business. They play a vital role in achieving goals that the FS might not meet alone. Data provided by the FS shows that over 200 community organizations and businesses partner with the FS on various projects throughout New Mexico. **Table 8.1** below lists the types of partners the FS worked with in 2005.

Table 8.1: Partnership Types for All New Mexico National Forests, 2005

Partner Type	Example	Number of Partnerships
Federal	US Fish and Wildlife	15
State Government	NM Youth Conservation Corps.	22
Local Government	Village of Questa	38
Tribal	Taos Pueblo	19
Non Governmental Org.	Mora County Livestock Assoc.	48
Private	Pecos Baldy Enterpises	36
Universities/ Public Schools	Western New Mexico University	28

Source: USDA Forest Service

The most common partners are non-governmental organizations, which are typically non profit organizations such as neighborhood associations and agricultural sustainability groups. State government agencies are also common partners, including Children, Youth and Families and the New Mexico State Land Office. These fruitful partnerships work to benefit both the forest land and the users.[157]

Several projects on the Carson NF have relied on collaborative relationships. In 1986, efforts on the Valle Vidal attempted to improve vegetative conditions for wintering elk through the use of prescribed burns. Fish barriers were created in all ranger districts (RDs) to prevent upstream migration of non-native fish such as brown and rainbow trout. This program has been around for about 20 years and over 106 projects have been funded at a minimum of $692,242.[158]

As another example, the NM Department of Game and Fish collaborates with the FS to help fund wildlife preservation projects on NM public lands through the New Mexico Habitat Stamp Program (HSP). Since its statewide implementation in 1991, all trappers, anglers and licensed hunters must buy a five dollar habitat stamp when purchasing a permit. The monies obtained from the stamp are used to fund wildlife and fishery habitat improvement projects.[159] As of 2003, the HSP fund has provided $398,862 for a range of projects; the Carson NF spent $293,379 in the form of project planning and implementation as well as conducting endangered species surveys and NEPA documentation.[160]

[157] USDA Forest Service, Southwestern Regional Collaboration Newsletter, February 2006.
[158] Ibid.
[159] USDA Forest Service, Carson National Forest, http://www.fs.fed.us/r3/carson/press_releases/03-12-03_partnerships.htm.
[160] Ibid.

Not everyone is interested in collaborating, however. The FS is often perceived as illegitimate and unproductive land managers.[161] The FS is sometimes perceived by residents as representatives of the government that "stole" their land over one hundred years ago. The experiences of local residents' forbearers have resulted in a sense of ownership among traditional users that proceeds and overrides the jurisdiction of the FS System. These traditional users rely on their own values and beliefs regarding access to and use of forest lands rather than following FS management plans and directives.[162] A study on the attitudes, values, and beliefs towards the FS illustrates that this issue still remains a barrier to relations between FS and traditional users.

8.1 Grants and Agreements

The FS provided a list of 35 grants issued to various entities since 1999.[163] The data show that the total grants and agreements amount for the same time period is $5,105,307. Of this total amount, the FS contributed $3,386,415 in cash and in-kind contributions. The range of partner organizations is broad, including environmental advocacy groups, utility companies and citizen involvement organizations. Some of the larger amounts are with agencies such as Kit Carson Rural Electrical Cooperative ($491,155), Taos Canyon Neighborhood Association ($449,608), and the Forest Guild ($386,208). The full list provided by the FS can be found on **Table A.6** in the appendix.

8.2 Collaborative Forest Rehabilitation Program

The Collaborative Forest Rehabilitation Program (CFRP) is one of the most significant ways the forest has been teaming up with communities. The Community Forest Restoration Act of 2000 (Title VI, Public Law 106-393) established a cooperative forest restoration program in New Mexico. The program provides cost-share grants to stakeholders for forest restoration projects on public land. Projects are designed through a collaborative process and must address specific issues, such as wildfire threat reduction, ecosystem restoration, preservation of old and large trees, and increased utilization of small diameter wood products. The Act authorizes up to $5 million annually. State, local and tribal governments, educational institutions, landowners, conservation organizations and other interested public and private entities are all eligible to apply for funds.

In New Mexico, about 13 projects were funded between 2001 and 2005; at least three were in the Carson NF. An example of a funded CFRP project, Ensenada Forest Health Restoration Project, is managed by Alfonso Chacon and Sons, a private company in Ojo Caliente. According to the FS, the project proposes to implement a 260 acre restoration project in the Ensenada area of the Vallecitos Federal Sustained Yield Unit.[164] The goals of the project are to restore ecosystem functions, re-establish natural fire regimens, and improve stand structure and species

[161] Raish, C. (2000). Environmentalism, the Forest Service, and the Hispano Communities of Northern New Mexico. Society & Natural Resources, 13: 489-508.

[162] Russell, J. and Adams-Russell, P. (2005). Attitudes, Values and Beliefs Toward National Forest System Lands: The Carson National Forest. USDA Forest Service.

[163] A list of G&A Incoming and Outgoing Funds was provided to BBER. BBER is unable to know if this list is exhaustive, but it appears to be the best data available.

[164] USDA Forest Service, Collaborative Forest Restoration Program, 2001-2005 Project Summaries and Contact Information.

composition. Additionally, the project aims to restore meadows by relocating unnecessary roads and removing encroaching conifers. Other benefits of the project are the establishment of collaborative relationships among community groups, the creation of jobs, and the provision of public outreach and education. Other partners in the project include the FS, Forest Guardians, Forest Guild, Mesa Vista Public Schools, Ojo Caliente Mineral Springs, and Forest Guild Youth Conservation Corps to name a few.[165]

Research examining attitudes and beliefs toward the Carson NF found that many people are satisfied with the CFRP as it is a successful way to mesh ecological values with local economic benefits.[166]

8.3 Volunteers

According to data collected from the USAD FS, the Carson NF benefited from the work of at least 228 volunteers between 2003 and 2005. **Table 8.2** outlines the age and gender composition of the Carson NF volunteers. Seventy eight percent of all the Carson NF volunteers were over 55 years of age, implying older people are more likely to have the time, willingness and interest to donate their services to the NF. However, the data does not include the volunteer support provided by Philmont Boy Scout Ranch, which provides forest volunteer opportunities to Boy Scouts from all over the country.[167]

The total number of volunteers is significantly higher in 2005 than in 2004. Also in 2004, the proportion of older volunteers was much lower, 15 percent versus 78 percent in 2005.

Table 8.2: Age and Gender of The Carson NF Volunteers, 2003-2005[168]

	2005				2004				2003			
	< 18	18-54	55+	TOTAL	< 18	18-54	55+	TOTAL	< 18	18-54	55+	TOTAL
Male	0	29	99	128	1	26	8	35	0	110	95	205
Female	0	20	80	100	1	16	0	17	0	61	7	68
Total	0	49	179	228	2	42	8	52	0	171	102	273

Volunteers comprise a major labor source for the FS, allowing the agency to take on more projects than it ever could without such support. Volunteers perform a long list of tasks, including maintaining recreation sites and trails, litter pick up and wildlife restoration. In the Carson NF, the most common volunteer activities involve wildlife, fish and rare plants. Volunteers provided more than $45,000 worth of labor on related tasks. The relationships between volunteers and the FS not only benefit the NF, but the volunteers themselves are provided opportunities learn about maintaining and sustaining forest health.

[165] USDA Forest Service CFRP Website, http://www.fs.fed.us/r3/spf/cfrp/index.shtml.
[166] Russell, J. and Adams-Russell, P. (2005). Attitudes, Values and Beliefs Toward National Forest System Lands: The Carson National Forest. USDA Forest Service.
[167] The data provided to BBER had no record of volunteers under the age of 18.
[168] Data does not include volunteers from the Philmont Boy Scout Ranch.

In 2003, the Albuquerque Wildlife Federation celebrated 20 years of project work on the Valle Vidal. The group has worked on constructing numerous fences, planting and fencing woody riparian vegetation and improving wetland and watershed conditions. Trout Unlimited and New Mexico Trout have worked on the Carson NF constructing willow enclosures, angler access structures, in addition to gathering and assembling fish data and several other projects.[169]

The Philmont Scout Ranch is located in Cimarron, New Mexico, about 45 miles west of Taos. The center has served as the only national volunteer training center for the Boy Scouts of America since 1950. Each year, more than 6,000 Scouts and family members visit the center for training.[170] A 2003 press release noted that approximately 1,200 Boy Scout volunteers visit the Questa RD every year to work on resource management, snag recruitment and watershed improvement projects.[171]

Not including the work provided by the Boy Scouts, the FS estimates the appraised value of 1,610 volunteer hours at just under $20,000 in 2005, as shown in Table 8.3. In comparison, the Cibola NF estimated the value of volunteers to be over $400,000 and the Gila NF estimated $289,000 for the same year. The data accounts for the "skill-level" of volunteers, adjusting appraised value to the Government Pay Grade scale. The "person years" column illustrates how many years worth of work was subsidized by the efforts of volunteers. Over the past three years, the FS has received the most benefit from volunteer efforts related to wildlife and recreation related activities.

Table 8.3: Value of Volunteers on The Carson NF

	2005			2004			2003		
Resource Category	Accum. Hours	Appraised Value (Dollars)**	Person Years*	Accum. Hours	Appraised Value (Dollars)**	Person Years*	Accum. Hours	Appraised Value (Dollars)**	Person Years*
Recreation	36%	$3,954	0.32	86%	$6,805	0.29	59%	$43,747	2.33
Heritage Program	0%	$0	0.00	0%	$0	0.00	11%	$12,563	0.43
Wildlife, Fish & Rare Plants	64%	$45,406	0.57	8%	$1,359	0.03	20%	$16,966	0.78
Range Management	0%	$0	0.00	0%	$0	0.00	1%	$0	0.04
Forest Management	0%	$0	0.00	0%	$0	0.00	0%	$480	0.01
Watershed & Air Management	0%	$0	0.00	6%	$1,144	0.02	9%	$6,694	0.34
Protection	0%	$0	0.00	0%	$0	0.00	0%	$0	0.00
Research	0%	$0	0.00	0%	$0	0.00	0%	$0	0.00
Business & Finance	0%	$0	0.00	0%	$0	0.00	0%	$0	0.00
Facilities Construction (Off-Center)	0%	$0	0.00	0%	$0	0.00	0%	$0	0.00
Facilities Construction (On-Center)	0%	$0	0.00	0%	$0	0.00	0%	$0	0.00
Other Facilities	0%	$0	0.00	0%	$0	0.00	0%	$0	0.00
Other	0%	$0	0.00	0%	$0	0.00	0%	$0	0.00
TOTALS	100%	$49,360	0.89	100%	9,308	0.34	100%	$80,450	3.93

Source: USDA National Forest Service 'Human Resources' Data.

* Accum. Hours/1800 Hours (Expressed in years)

** Accum. Hours*Estimated Government Pay Grade

Focus groups with the Carson NF users revealed a perception among local residents that the NF needs to more effectively organize and work with volunteers in adjacent communities. Participants expressed their willingness to contribute their assistance or time to perceived problems such as trail maintenance, signage issues and education. They also perceive the Agency

[169] USDA Forest Service, Southwestern Regional Collaboration Newsletter, February 2006

[170] Philmont Scout Ranch Official Website, http://www.scouting.org/philmont/.

[171] USDA Forest Service, Carson National Forest, http://www.fs.fed.us/r3/carson/press_releases/03-12-03_partnerships.htm.

needs to improve its receptiveness to these concerns and work more effectively with volunteers.[172]

8.4 Challenges and Opportunities for Forest Management

The Carson NF obtains much needed support from local communities in the form of volunteers and collaborative relationships. This support allows the forest to facilitate innovative projects aimed at improving forest health and reducing threats, such as fires and non-native species. The Carson NF has well established mechanisms in place to solicit and manage collaborative relationships, which is a substantial benefit.

Local communities have the potential to provide a healthy supply of volunteers for the forest, especially with the Philmont Boys Ranch nearby. However, recruiting volunteers may be difficult because northern New Mexico is a sparsely populated region.

The FS has opportunities to improve the already well-developed community relationships. There is documented interested among locals to volunteer at the forest. Having more volunteers on forest land benefits not only the forest but also the volunteers themselves. Volunteers can receive personal benefits by working in the forest, such as learning about forest health, wildlife conservation, and the value of forest maintenance. By actively recruiting young volunteers from local communities, it offers the chance to grow their enthusiasm about the forest and transferring forest-related knowledge and wisdom to the next generation.

Another opportunity to improve community relationships is to engage local communities in decision-making processes that are meaningful to them. This may be especially valuable in areas where families' livelihood and culture are directly tied to the land. In many cases, traditional users and long-term residents may be reluctant to work with the FS because they may perceive their attachment and "land ethic" to be beyond the bureaucratic entanglements of the FS. The FS, in this case, must convince skeptics that it shares their concerns about the land and honors its cultural significance before the agency will be accepted as legitimate land managers.

As mentioned in a previous section, providing opportunities for locals to share their collective knowledge about the forest and its uses sends a clear and welcoming message. Native American tribes and long-time ranchers hold a traditional wisdom about the land and its health, a potentially valuable resource for forest management. As people who have lived with the land and have depended on it for their livelihood, they feel they can tell when forest health is being compromised and can help predict possible outcomes of forest planning activities.

Developing community relationships is not without risks. Relationships between the Forest Service, as an agency, and local communities are often strained when it comes to decision making and land management issues. The FS serves as an arbiter of conflicts, occupying a precarious but familiar position. Tribes sometimes view the FS as both an advocate and also a threat, especially when it comes to protecting special areas. Special interests (wildlife conservationists, environmental interests, development advocates, etc) influence FS decisions that may result in perceived hardships for the local landowners. For instance, tree clearing efforts may raise the ire

[172] Russell, J. and Adams-Russell, P. (2005). Attitudes, Values and Beliefs Toward National Forest System Lands: The Carson National Forest. USDA Forest Service.

of wildlife conservationists, but it provides added safety to local residences. This mismatch of interests can create tension between groups, applying more pressure on the FS.

It is impossible for the FS to address all needs for all interests. However, the Carson NF maintains positive working relationships with local communities through CFRP grants and other arrangements.

9 Principal Findings, Challenges and Opportunities

9.1 Economic Impacts of the Carson NF

The Carson NF directly and indirectly accounts for an estimated $414 million in output, $89 million in labor and 4,000 jobs, equal to about 9 percent of employment in the four county assessment area. Visitor and recreational activities, including skiing, account for about 4 of 5 jobs and an equivalent share of labor income; FS operations make up much of the remainder. Oil and gas extraction in Rio Arriba County generates revenues but little in the way in the way of employment and labor income. Despite their traditional significance, ranching and timber harvesting on the Carson NF make only a marginal contribution to the local economy. As it does not occur on Forest land, this study does not measure the role of the Forest in creating markets for residential development, including second homebuyers and amenity migrants, but there is every reason to believe that this may account for one of the most significant impacts of the Forest on the regional economy.

In all likelihood, the trends established over the past few decades will continue and even accelerate during the foreseeable future. The share of national income received by the top tiers of income earners has increased significantly over the past two decades, creating a pool of funds available for leisure spending and second home purchase. Further, the retirement of the 'baby boomers' will be reaching its apex over the next two decades, broadening the market for amenity rich residential development. The areas surrounding Carson NF, particularly near Questa and Camino Real RDs, are attractive locations for these populations and activities. On the flip side, economic strategies traditionally employed in the area, typically combining ranching, *acequia* agriculture, wood collection and other communal land uses, appear to be less viable in the context of rising land values and declining prices for primary commodities. Consequently, many of these traditional users are party to the transformation of land use patterns, as ranches and agricultural lands are sold for residential and second home development.

9.2 Socioeconomic Change and Conflicting Demands for Forest Management

The economic trends described above have significant implications for the social and cultural dynamics of the assessment region. Historically, the region has been occupied by populations, whose economic strategies and cultural identities have been closely tied to the land, including Native American peoples and Hispano land grant communities. For decades, these groups have felt marginalized by FS resource management policies which were seen locally to be associated with outside and better organized interests in resource extraction industries (e.g. Vallecitos Federal Sustained Yield Unit, Jicarilla oil and gas exploration). Although the interest in resource extraction in northern New Mexico has faded with the globalization of resource industries, traditional groups now face new pressures. The in-migration of a new population of retirees and amenity migrants, the maturation of outdoor recreational industries, and the growth of the environmental movement in the region place demands on the FS to enact conservation policies

that again are seen by traditional Forest users as marginalizing their position in favor of outside and better organized interests[173].

The potential for conflict between traditional interests and the growing population of retirees, second homebuyers, tourists and recreational users is further exacerbated by the structural characteristics of emerging economic development model. Typically, economic development driven by land development tourism and recreation tend to produce employment that is either short-term (in construction) or low-paying (in hospitality). Thus, traditional users find not only that rising land values and public regulation crowd out traditional uses such as grazing and wood harvesting, but that emerging uses provide few opportunities to earn incomes needed to remain in the area.

As a principal land manager, the FS frequently finds itself at the center of these conflicts. To be effective in mitigating conflict, it must be seen as a fair and legitimate arbiter, which means not only balancing the interests of the various groups but also national (increasingly environmental) mandates with local (increasingly economic) needs. One possible strategy – frequently referenced but not always successful – is establish sustainable development initiatives that involve both traditional and newly emerging communities. This builds upon a common interest – within traditional communities to continue to have access to Forest resources and to see the propagation of established forest management practices, and within newer arrivals to be rooted in a rich and diverse cultural landscape.

9.3 Land Development and Ecological Management

Nationally, the FS faces the challenge of managing the ecological risks associated with land development along Forest boundaries, and this too is the case in northern New Mexico. In the case of Carson NF, fire is the primary hazard. As a result of a long period of drought and decades of fire suppression, much of the Carson NF faces the risk of "uncharacteristic" or catastrophic wildfire. Land development along the Wildland-Urban interface exacerbates the risks associated with such wildfire, both as a potential contributing cause of fire and as life and property that is priority for firefighters. Another ecological hazard associated with land development along the Wildland-Urban interface is species management. New development has both the potential to introduce invasive plant and animal species, and to attract wild species such as bear into domesticated environments.

Fragmented patterns of landownership and use further complicate these risks. Of the 1.587 million acres within the boundaries of the Carson NF, about 105,000 acres (or nearly seven percent) are privately owned. Far from consolidated, privately owned land is widely distributed in relatively small parcels, creating a fragmented or 'checkerboard' pattern of land ownership in various parts of the Forest. Further, the many areas of the Carson NF tend to be relatively more accessible than those of other NFs in New Mexico. In the Carson NF, only 57,000 acres, or less than 4 percent of all forest land is designated as Inventoried Roadless Areas (IRAs). As a whole, more than 12 percent of the five National Forests in New Mexico are designated as IRAs.

[173] Wilmsen, Carl. (2001). "Sustained yield recast: the politics of sustainability in Vallecitos, New Mexico", *Society and Natural Resources*, 14: 193-207.

As a result of these patterns, development often occurs in very isolated locations, significantly increasing the costs and complexity of Forest management. Moreover, the 'checkerboard' pattern of landownership implies multiplication of Wildland-Urban interfaces – in a checkerboard pattern there is a greater density of boundaries between private development and NF land, multiplying the ecological challenges. An additional complication of fragmented patterns of development in the Carson NF is that it interrupts the consistent and comprehensive application of ecological management practices. For example, the containment of invasive species requires that measures be taken on the scale of an entire ecosystem – small areas without application can serve as a haven for the species and a basis for its regeneration. Yet, private landowners do not always share the same concerns or priorities as federal land managers, thus impeding the effective implementation of management practices. Further, many of the new residents relocate from more urban environments, and have limited direct experience in managing their impact on wild lands. Without experience, these populations are more likely to engage in ecologically risky behavior and less likely to undertake the measures that would protect them from ecological hazards.[174]

On the positive side, the checkerboard pattern of landownership also provides a valuable opportunity for Carson NF managers to demonstrate alternative and sustainable management practices to private landowners that neighbor FS-owned land. This enables the FS to better achieve its land management objectives and fulfill its broadest mission to demonstrate the sustainable multiple-use management concept.

9.4 Differences among Ranger Districts

The six RDs in the Carson NF face very distinct challenges and require management policies specific to each. In broad strokes, the greatest similarities are among the three central RDs (Tres Piedras, Canjilon and El Rito) and the two eastern RDs (Questa and Camino Real); Jicarilla RD is relatively distinct from the others.

The areas surrounding the three central RDs are thinly populated by small communities with populations less than 1,000. Many in these communities are strongly associated with Hispano land grants; have an interest in the continuing use of Forest land for grazing and timber harvesting; and are at an early stage of tourism and residential development. Employment opportunities in communities neighboring the Forest are few, forcing most residents to travel more than an hour to work. This region is arguably the most closely tied to the Forest and the patterns of fragmented landownership that make public and private land management practices so interdependent is most pronounced here. Further, Mexican spotted owl habitats subject to close regulation tend to be concentrated in these three Districts. By the same token, with strong internal identity and cohesion, a history of contentious interaction with the FS, and the increasing integration as result of the growth of tourism and development, this subregion faces the greatest degree of socioeconomic dislocation. Yet, on the other hand, given the nature of the challenges that this subregion faces, one may hope that emerging strategies of community partnership have the most to offer in this area. Combined, these three RDs comprise 53 percent of the Carson NF.

The eastern-most subregion, including Camino Real and Questa RDs, has the most developed tourism and residential development markets. Carson NF's principal recreational attractions,

[174] McKinley, J. and Johnson, K. "On the Fringe of Forests: Where Homes and Fire Meet," *New York Times*, June 26, 2007.

including Taos Valley and Red River ski areas are located in these Districts, and areas with the greatest density of second home and retiree residential development, such as those in and near Taos, Arroyo Hondo, Angel Fire and Eagle's Nest, are closest to these eastern-most Districts. Conversely, traditional uses of the land are least prevalent in these areas. Ecological issues are most pressing in this area, as the intensity of use and development raises concerns for wildfires and resource degradation. In this subregion, the FS finds the greatest concentration of natural allies, but also some of its sharpest critics. Camino Real RD comprises 24 percent of the Carson NF, and the Questa RD an additional 12 percent.

Finally, located along the Colorado border on the western edge of the Jicarilla Apache Reservation, the Jicarilla RD is isolated by some distance from the other RDs of the Carson NF. In general terms, Jicarilla RD has more in common with the Four Corners area than RDs of north central New Mexico. The principal economic use of the district is oil and gas exploration, and in that way it is closely tied to interests located in Farmington. There are few other economic uses of the Forest. The population nearest the district is predominately Native American, on the Jicarilla Apache Reservation and in the small town of Dulce. Unlike other Districts, resistance to FS policies have been generally non-local – plans to open undeveloped areas of the District for gas exploration have been fought by Santa Fe-based environmental groups but have been tacitly accepted by local communities which benefit from revenue sharing and, to a lesser extent, employment opportunities.

9.5 Community Partnerships

Faced with federal mandates and declining resources, the FS is turning increasingly to community partnerships as a way of achieving its goals. The Carson NF has a long history of public-private partnerships, and a strong program in place to attract and recruit potential partners and allies. Programs such as the Collaborative Forest Restoration Program are effective because they incorporate local businesses and non-profits into forest management. Carson NF managers must continue to pursue opportunities to develop similar programs and relationships with traditional land users, including Hispanos and Native Americans. Failing to develop such programs poses the risk of further alienating traditional groups, as they may perceive the strength of partnerships with environmental, urban and business groups as further evidence of bias in forest policy. To this end, one possible strategy may be to involve traditional communities in decision making in the area of sustainable forest management practice. This may help to bring together long established and newly expanding communities in a common effort while at the same time passing along local knowledge about sustainable land management.

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Appendices

Table A.1: Population of Places in Assessment Area, 2000

	Number			Percent Change	
Carson Places	**1980**	**1990**	**2000**	**1980-1990**	**1990-2000**
Alcalde CDP	.	308	377	NA	22%
Angel Fire village	.	93	1,048	NA	1027%
Chama village	1,090	1,048	1,199	-4%	14%
Chamisal CDP	.	272	301	NA	11%
Chimayo CDP	1,993	2,789	2,924	40%	5%
Cimarron village	888	774	917	-13%	18%
Cuartelez CDP	.	.	452	NA	NA
Dulce CDP	1,648	2,438	2,623	48%	8%
Eagle Nest village	202	189	306	-6%	62%
Espanola city	6,803	8,389	9,688	23%	15%
La Puebla CDP	.	.	1,296	NA	NA
Maxwell village	316	247	274	-22%	11%
Penasco CDP	.	648	572	NA	-12%
Picuris Pueblo CDP	.	.	86	NA	NA
Questa village	1,202	1,707	1,864	42%	9%
Ranchos de Taos CDP	1,411	1,779	2,390	26%	34%
Raton city	8,225	7,372	7,282	-10%	-1%
Red River town	332	387	484	17%	25%
Regina CDP	.	.	99	NA	NA
Rio Chiquito CDP	.	.	103	NA	NA
Rio Lucio CDP	.	.	379	NA	NA
San Juan CDP	.	465	592	NA	27%
Santa Clara Pueblo CDP	.	1,156	980	NA	-15%
Santa Cruz CDP	.	2,504	423	NA	-83%
Springer town	1,657	1,262	1,285	-24%	2%
Taos town	3,369	4,065	4,700	21%	16%
Taos Pueblo CDP	.	1,187	1,264	NA	6%
Taos Ski Valley village	.	.	56	NA	NA
Vadito CDP	.	283	242	NA	-14%
Wagon Mound village	416	319	369	-23%	16%
TOTAL CARSON PLACES	**29,552**	**39,681**	**44,575**	34%	12%
NM TOTAL	1,303,303	1,515,069	1,819,046	16%	20%

Source: US Census Bureau, Decennial Census, 1980, 1990, 2000. Calculations done by UNM - BBER.
CDP - Census Designated Place

Table A.2 Designated Trails on The Carson NF

Canjilon Ranger District

TRAIL NAME	TRAIL TYPE
Rim Vista	Standard/Terra Trail
Salazar	Standard/Terra Trail
Vega Paz	Standard/Terra Trail
Fifteen Springs	Standard/Terra Trail
Echo Ampitheater	Standard/Terra Trail
Joaquin Canyon	Standard/Terra Trail
Cebolla	Standard/Terra Trail
Martinez Canyon	Standard/Terra Trail
Yeso	Standard/Terra Trail
Lookout	Standard/Terra Trail
Burns	Standard/Terra Trail
Hidden Lake	Standard/Terra Trail
Hart	Standard/Terra Trail
Canjilon Mountain	Standard/Terra Trail

Questa Ranger District

TRAIL NAME	TRAIL TYPE
Williams Lake	Snow Trail
Cebolla Mesa	Standard/Terra Trail
Williams Lake	Standard/Terra Trail
Midnight	Standard/Terra Trail
Goose Creek	Standard/Terra Trail
Poineer Creek	Standard/Terra Trail
Lake Fork	Standard/Terra Trail
Gavilian	Standard/Terra Trail
Columbine	Standard/Terra Trail
Sawmill Park	Standard/Terra Trail
Manzanita	Standard/Terra Trail
Italianos	Standard/Terra Trail
Willow Fork	Standard/Terra Trail
Dry Fork	Standard/Terra Trail
Jiron Canyon	Standard/Terra Trail
Heart Lake	Standard/Terra Trail
Pinabete	Standard/Terra Trail
Placer Fork Shortcu	Standard/Terra Trail
Exploration	Standard/Terra Trail
East Fork	Standard/Terra Trail
Lobo Peak	Standard/Terra Trail
Yerba	Standard/Terra Trail
Long Canyon	Standard/Terra Trail
Red River Nature	Standard/Terra Trail
Deer Creek	Standard/Terra Trail
Placer Fork	Standard/Terra Trail
San Cristobol	Standard/Terra Trail
Midnight Chuckwagon	Standard/Terra Trail
Bull Creek	Standard/Terra Trail
Rito Del Medio	Standard/Terra Trail
Wheeler Peak	Standard/Terra Trail
Lost Lake	Standard/Terra Trail
Cow Lake	Standard/Terra Trail
Lama Canyon	Standard/Terra Trail
Gold Hill	Standard/Terra Trail
Williams/Wheeler	Standard/Terra Trail
Goose Lake/Gold Hil	Standard/Terra Trail

Camino Real Ranger District

TRAIL NAME	TRAIL TYPE
Amole	Snow Trail
Capulin Ice Caves	Snow Trail
Elliot Barker	Standard/Terra Trail
Amole	Standard/Terra Trail
Devisadero Loop	Standard/Terra Trail
Capulin Ice Caves	Standard/Terra Trail
Sardinas Motorized	Standard/Terra Trail
Rio Chiquito	Standard/Terra Trail
Cerro Vista	Standard/Terra Trail
Policarpio	Standard/Terra Trail
Valle De Los Romero	Standard/Terra Trail
Agua Sarca	Standard/Terra Trail
Cortado	Standard/Terra Trail
South Boundry	Standard/Terra Trail
Drake Canyon Loop	Standard/Terra Trail
Ojitos	Standard/Terra Trail
Paradise	Standard/Terra Trail
Cordova Canyon	Standard/Terra Trail
Buena Suerte	Standard/Terra Trail
Rancho De Rio Grand	Standard/Terra Trail
El Nogal Nature Tra	Standard/Terra Trail
Ojito Maes	Standard/Terra Trail
Serpent Lake	Standard/Terra Trail
Angostura Cutoff	Standard/Terra Trail
Serpent Lake Cutoff	Standard/Terra Trail
Indian Lake Trail	Standard/Terra Trail
Pot Creek Interpret	Standard/Terra Trail
Osha Canyon	Standard/Terra Trail
Comales	Standard/Terra Trail
Middle Fork	Standard/Terra Trail
West Fork Santa Bar	Standard/Terra Trail
East Fork Santa Bar	Standard/Terra Trail
Indian Creek	Standard/Terra Trail
Bear Mountain	Standard/Terra Trail
Camino Real	Standard/Terra Trail
San Leonardo	Standard/Terra Trail
Trampas	Standard/Terra Trail
Divide	Standard/Terra Trail
Jicarita Creek	Standard/Terra Trail
Gallegos	Standard/Terra Trail
Hidden Lakes	Standard/Terra Trail
La Cueva Canyon	Standard/Terra Trail
Angostura	Standard/Terra Trail
Capulin	Standard/Terra Trail
Maes Canyon	Standard/Terra Trail
Agua Piedra Handica	Standard/Terra Trail
Flechado Canyon	Standard/Terra Trail
La Cueva	Standard/Terra Trail
La Cueva Cutoff	Standard/Terra Trail
Mondragon	Standard/Terra Trail
Comales Cutoff	Standard/Terra Trail
Diablo	Standard/Terra Trail
Rito De La Olla	Standard/Terra Trail
La Cueva Peak	Standard/Terra Trail

Table A.3: Capital Improvements in Assessment Area

Counties	Road	Terminus	Year	Amount	Description
Colfax	LOCAL	Railroad Depot in Raton	2006	$250,667	Miscellaneous Construction
Colfax	LOCAL	Angel Fire Trails	2006	$308,000	Multi-Use Path
Colfax	LOCAL	Angel Fire Road	2006	$100,000	Reconstruction
Colfax	LOCAL	Country Club Drive	2006	$666,667	Road Improvements
Colfax	I25	MP 450 to MP 456	2010	$5,000,000	3R & Reconstruction
Colfax	I25	Interchange Ramp Rehabilitation	2009	$1,000,000	Ramp Modifications
Colfax	I25	US 654 - US 87 Intersection with I-25 (Exit 451) in Raton; Bridge # 6108	2008	$3,000,000	Interchange Rehabilitation
Colfax	L00016	Springer - Bridge # 3457	2009	$1,500,000	Bridge Replacement
Colfax	NM0058	7.1 Miles East of JCT US 64	2008	$500,000	Bridge Replacement
Colfax	NM0058	7.1 Miles East of JCT US 64	2008	$500,000	Bridge Replacement
Colfax	NM0434	Village of Angel Fire	2006	$133,333	Landscaping
Colfax	US0056	Clayton, 6th Street to Railroad	2010	$2,600,000	3R & Reconstruction
Colfax	US0056	Clayton, 6th Street to Railroad	2010	$200,000	Pedestrian Facilities
Colfax	US0056	JCT NM 39 - East	2007	$4,500,000	Pavement Rehabilitation
Colfax	US0056	Springer - East to Abbott	2006	$9,592,000	Reconstruction
Colfax	US0056	Abbott - East	2007	$2,500,000	Preventative Maintenance
Colfax	US0056	13.71 Miles East of JCT NM 39 - East	2011	$1,500,000	Pavement Rehabilitation
Colfax	US0056	13.71 Miles East of JCT NM 39 - East	2011	$1,000,000	Pavement Rehabilitation
Colfax	US0064	Within Village of Eagle Nest	2008	$500,000	Miscellaneous Construction
Colfax	US0064	.5 Miles West of JCT. NM 434 - East for 1 mile and MP 282 to MP 285	2008	$1,000,000	Intersection Improvements
Colfax	US0064	.5 Miles West of JCT. NM 434 - East for 1 mile and MP 282 to MP 285	2008	$2,500,000	Overlay
Colfax	US0064	4 Miles West of JCT NM 434 - East for 1 mile and MP 282 to MP 285	2011	$1,500,000	Pavement Rehabilitation
Colfax	US0064	4 Miles West of JCT NM 434 - East for 1 mile and MP 282 to MP 285	2011	$1,500,000	Pavement Rehabilitation
Colfax	US0064	JCT I-25 Loop 17 - East to JCT I-25 and I-25 Interchange	2009	$500,000	Miscellaneous Construction
Colfax	US0064	Raton to Clayton	2007	$11,037,225	Reconstruction
Colfax	US0064	1 mile East of JCT NM 193 - East	2007	$3,000,000	Pavement Rehabilitation
Colfax	US0064	Raton to Clayton	2006	$11,037,225	Reconstruction
Colfax	US0064	Raton to Clayton	2006	$15,260,000	Reconstruction
Rio Arriba	LOCAL	Espanola Railroad Museum	2007	$532,000	Miscellaneous Construction
Rio Arriba	LOCAL	Lindrith Rds	2006	$25,000	Road Improvements
Rio Arriba	LOCAL	Canones Creek Bridge	2006	$20,000	Bridge Rehabilitation
Rio Arriba	LOCAL	JCT US 64 / J8 South Pedestrian Facilities	2009	$585,000	Pedestrian Facilities
Rio Arriba	LOCAL	JCT US 64 South in Dulce	2011	$325,000	Miscellaneous Construction
Rio Arriba	LOCAL	Transit Mix Road NM 584 to Lowdermilk Lane	2006	$614,667	Road Improvements
Rio Arriba	390035	County Road 35	2006	$5,000	Road Improvements
Rio Arriba	390036	County Road 36	2006	$5,000	Road Improvements
Rio Arriba	LOCAL	Guardrail Installation	2006	$77,000	Guardrail, Safety
Rio Arriba	390073	County Roads 69 and 73	2006	$50,000	Road Improvements
Rio Arriba	390089	County Road 89A	2006	$55,000	Road Improvements
Rio Arriba	390107	County Rds 107 / 108 in La Mesilla	2006	$10,000	Road Improvements
Rio Arriba	390107	County Rds 144, 107, 108, 44, and 4	2006	$100,000	Road Improvements
Rio Arriba	390108	Commission District 2 Roads	2006	$25,000	Road Improvements
Rio Arriba	390162	Guardrail Installation	2006	$27,000	Guardrail, Safety
Rio Arriba	FL5345	Various Espanola Streets`	2006	$50,000	Road Improvements
Rio Arriba	FL5349	Onate St. Bridge	2007	$1,622,000	Bridge Replacement
Rio Arriba	FL5349	Onate St. Bridge	2008	$1,654,000	Bridge Replacement
Rio Arriba	FL5349	Espanola Main St. (Paseo De Onate)	2006	$5,400,000	Pavement Rehabilitation
Rio Arriba	FL5349	Paseo de Onate / NM-30	2006	$75,000	PE and R-O-W
Rio Arriba	NM0017	NM 17 / US 64 / 84	2006	$200,000	Lighting -Safety
Rio Arriba	NM0068	JCT 84/285 to JCT NM 291	2006	$750,000	Signalization
Rio Arriba	NM0068	Fairview Lane North 3 Miles	2007	$3,000,000	Reconstruction
Rio Arriba	NM0068	R-O-W Fencing	2006	$300,000	Fencing
Rio Arriba	NM0068	JCT NM 74 to Velarde	2007	$5,200,000	Reconstruction
Rio Arriba	NM0068	Velarde to Pilar	2010	$5,300,000	3R & Reconstruction
Rio Arriba	NM0068	Velarde to the Horseshoe Curve	2006	$250,000	Professional Services
Rio Arriba	NM0074	JCT NM 68 to JCT Old NM 74	2010	$750,000	Pedestrian Facilities
Rio Arriba	NM0076	1.1 Miles east of JCT NM0503 - East	2007	$6,000,000	Reconstruction
Rio Arriba	NM0096	R-O-W Fencing	2006	$175,000	Fencing
Rio Arriba	NM0537	Deer Crossing Beacons	2006	$150,000	Safety
Rio Arriba	NM0584	Fairview Lane Drainage Improvements	2006	$1,000,000	Drainage Improvements
Rio Arriba	US0064	San Juan / Rio Arriba C/L to JCT US 84	2008	$8,000,000	Pavement Rehabilitation
Rio Arriba	US0064	San Juan / Rio Arriba C/L to JCT US 84	2009	$2,000,000	Bridge Replacement
Rio Arriba	US0064	San Juan / Rio Arriba C/L to JCT US 84	2007	$5,300,000	Pavement Rehabilitation
Rio Arriba	US0064	San Juan / Rio Arriba C/L to JCT US 84	2009	$750,000	Bridge Replacement
Rio Arriba	US0064	San Juan / Rio Arriba C/L to JCT US 84	2009	$7,700,000	Pavement Rehabilitation

Table A.3 Cont'd: Capital Outlays for Counties in Assessment Area

Rio Arriba	US0064	San Juan / Rio Arriba C/L to JCT US 84	2006	$3,000,000	Bridge Replacement
Rio Arriba	US0064	San Juan / Rio Arriba C/L to JCT US 84	2006	$7,000,000	Pavement Rehabilitation
Rio Arriba	US0064	San Juan / Rio Arriba C/L to JCT US 84	2006	$390,000	Right-of-Way Acquisition
Rio Arriba	US0064	San Juan / Rio Arriba C/L to JCT US 84	2006	$10,000,000	Reconstruction
Rio Arriba	US0064	Forest Boundary E of US0084 - East	2006	$7,500,000	Pavement Rehabilitation
Rio Arriba	US0084	Intersection with Paseo de Onate	2006	$5,400,000	Pavement Rehabilitation
Rio Arriba	US0084	Intersection with Paseo de Onate	2006	$800,000	Intersection Improvements
Rio Arriba	US0084	JCT NM0096	2007	$2,000,000	Overlay
Rio Arriba	US0084	Echo Ampitheatre to Cebolla	2009	$8,000,000	3R & Reconstruction
Rio Arriba	US0084	MP 249 to MP 254 Tierra Amarilla South	2007	$6,000,000	3R & Reconstruction
Rio Arriba	US0084	US0550 Warranty Work in District 5	2006	$100,000	Field Supplies
Rio Arriba	US0550	US0550 Warranty Work in District 5	2006	$1,400,000	Contract Maintenance
Mora	LOCAL	El Camino Del Monte Quemado Road	2006	$40,000	Road Improvements
Mora	LOCAL	El Carmen Rd	2006	$50,000	Road Improvements
Mora	FR2151	Wolf Creek - Bridge #5276	2011	$2,100,000	Bridge Replacement
Mora	I25	Bridges 7004, 7005, 7006, 7007	2006	$2,500,000	Bridge Rehabilitation
Mora	I25	MP 287 to MP 400	2011	$5,500,000	Pavement Preservation
Mora	I25	MP 400 to MP 412	2009	$3,000,000	Preventative Maintenance
Mora	NM0094	MP 18 East to JCT NM 518	2010	$1,900,000	Reconstruction
Mora	NM0094	MP 18 East to JCT NM 518	2010	$100,000	Right-of-Way Acquisition
Mora	NM0120	Canadian River Bridge Mora/Harding C/L	2008	$2,000,000	Bridge Deck Replacement
Mora	NM0434	NM 518 / NM 434 Intersection in Mora	2006	$1,945,000	3R & Reconstruction
Mora	NM0434	NM 518 / NM 434 Intersection in Mora	2006	$100,000	Right-of-Way Acquisition
Mora	NM0434	Correct Four Curves MP 0.0 to MP 17.5	2006	$1,500,000	3R & Reconstruction
Mora	NM0434	Correct Four Curves MP 0.0 to MP 17.5	2006	$100,000	Right-of-Way Acquisition
Mora	NM0434	Mora to Black Lake	2011	$4,000,000	3R & Reconstruction
Mora	NM0434	MP 18 to MP 24	2010	$3,000,000	3R & Reconstruction
Mora	NM0434	MP 18 to MP 24	2010	$2,000,000	Right-of-Way Acquisition
Mora	NM0518	.75 Miles S of JCT NM 442 - North	2006	$3,400,000	3R & Reconstruction
Taos	LOCAL	Cuchilla Hill Road	2006	$7,000	Road Improvements
Taos		Taos Airport Civil Air Patrol Hangar	2006	$50,000	Miscellaneous Construction
Taos	LOCAL	Red River Streets	2006	$200,000	Road Improvements
Taos	55C021	Santa Barbara Road	2006	$60,000	Road Improvements
Taos	55C134	St. Lavender Road	2006	$50,000	Road Improvements
Taos	FL7100	River Street / Pioneer Road	2006	$50,000	Road Improvements
Taos	NM0038	Through Red River	2006	$30,000	Miscellaneous Construction
Taos	NM0068	Scenic Overlook at Rio Arriba / Taos County Line	2006	$550,000	Scenic Overlook
Taos	NM0068	Scenic Overlook at Rio Arriba / Taos County Line	2007	$500,000	Auxilary Lanes
Taos	NM0068	Pilar to Horse Shoe Curve	2011	$1,100,000	3R & Reconstruction
Taos	NM0068	Pilar to Horse Shoe Curve	2011	$3,400,000	3R & Reconstruction
Taos	NM0068	Intersection NM 0068/CR 110	2006	$1,500,000	Intersection Improvements
Taos	NM0068	Taos Relief Route	2011	$500,000	New Construction
Taos	NM0068	Ranchos De Taos	2008	$2,810,000	Reconstruction
Taos	NM0068	JCT NM0518 North	2006	$441,333	Bicycle Lanes/Trails
Taos	NM0068	La Posta to Camino De La Placita	2010	$1,540,000	Four-Lane Construction
Taos	NM0068	La Posta to Camino De La Placita	2010	$3,460,000	Four-Lane Construction
Taos	NM0150	Intersection with Valencia Road	2006	$1,500,000	Intersection Improvements
Taos	NM0240	NM-240 in Taos	2006	$25,000	Road Improvements
Taos	NM0240	Ranchitos Road, Salazar Road to Carbajal Lane	2006	$163,887	Road Improvements
Taos	NM0518	R-O-W Fencing	2006	$300,000	Fencing
Taos	NM0585	Taos Truck Bypass	2006	$150,667	Pedestrian Facilities
Taos	NM0585	Taos Truck Bypass	2006	$5,000,000	Additional Lanes
Taos	US0064	Rio Grande River Gorge Bridge	2007	$2,000,000	Bridge Rehabilitation
Taos	US0064	Taos to Tres Piedras	2009	$4,600,000	3R & Reconstruction
Taos	US0064	JCT NM0068	2008	$500,000	Corridor Study
Taos	US0064	Taos North Town Limit to Placitas Road	2006	$60,000	Miscellaneous Construction
Taos	US0064	Taos North Town Limit to Placitas Road	2006	$2,700,000	Miscellaneous Construction
Taos	US0064	NM-64 in Taos	2006	$200,000	Road Improvements
Taos	US0064	NM 64 in Taos	2011	$2,500,000	3R & Reconstruction
Taos	US0064	Montoya to Mariposa in Town of Taos	2007	$100,000	Pedestrian Facilities
Taos	US0064	Montoya to Mariposa in Town of Taos	2007	$500,000	Miscellaneous Construction
Taos	US0285	Ojo Caliente - North	2008	$3,500,000	3R & Reconstruction
Taos	US0285	.2 Mile North of JCT NM011	2008	$2,500,000	Overlay
Taos	US0285	11.4 Miles South of JCT US64 - North	2008	$8,000,000	Overlay

Table A.4: Designated Recreational Sites on the Carson NF

Trail Name	Site Type	Operational Status	ROS Class
Canjilon District			
Canjilon Lakes Pg	Picnic Site	Open	Roaded Natural
Canjilon Lakes	Campground	Open	Roaded Natural
Trout Lakes	Campground	Open	Roaded Natural
Echo Amphitheater	Picnic Site	Open	Roaded Natural
Piedra Alumbre Visitor Center	Interpretive Site (Major)	Open	Roaded Natural
Rim Vista Trailhead	Trailhead	Open	
Tres Piedras Rocks	Picnic Site	Closed	Roaded Natural
Tres Piedras District			
Hopewell	Picnic Site	Open	Roaded Natural
Hopewell Cg	Campground	Open	Roaded Natural
Los Pinos	Campground	Open	
Laguna Larga	Camping Area	Open	
Lagunitas	Campground	Open	Semi-Primitive Motorized
El Rito District			
El Rito	Campground	Open	Roaded Natural
Cruces Basin Th	Camping Area	Open	Semi-Primitive Motorized
Questa District			
Lower Hondo	Campground	Open	Roaded Modified
Cuchillo Del Medio	Campground	Open	Roaded Modified
Twining	Campground	Open	Roaded Modified
Cabresto Lake	Campground	Open	
Elephant Rock	Campground	Open	Roaded Natural
Fawn Lakes	Campground	Open	Roaded Natural
Junebug	Campground	Open	Roaded Natural
Goat Hill	Campground	Open	
Columbine	Campground	Open	Roaded Natural
Italianos	Trailhead	Open	
Mccrystal Group Site	Group Picnic Area	Open	Roaded Natural
Cimarron	Campground	Open	Roaded Natural
Mccrystal	Campground	Open	
Cebolla Mesa	Campground	Open	Semi-Primitive Motorized
Shuree Ponds	Picnic Site	Open	Roaded Natural
Taos Ski Valley, Inc.	Ski Area Alpine	Open	
Red River Ski Area	Ski Area Alpine	Open	
La Bobita	Campground	Open	Roaded Modified
Upper Cuchilla	Campground	Open	
Rr Winter Trail System	Other Winter Sports Site	Open	Roaded Natural
Enchanted Forest	Other Winter Sports Site	Open	
Eagle Rock Lake	Picnic Site	Open	Roaded Natural
Mallette Th	Trailhead	Open	
Gavilan Th	Trailhead	Open	
Bull Of Woods/Wheeler	Trailhead	Open	Roaded Modified
Manzanita Th	Trailhead	Open	Roaded Natural
Yerba Th	Trailhead	Open	Roaded Natural
Williams Lake Th	Trailhead	Open	Roaded Modified
Pioneer Th	Trailhead	Open	
Goose Lake Th	Trailhead	Open	
Middle Fork Th	Trailhead	Open	Roaded Natural
East Fork Th	Trailhead	Open	Roaded Natural
Middle Fork Lake	Camping Area	Open	Roaded Natural
Shuree Ponds Fishing Site	Fishing Site	Open	
Goose Lake	Day Use Area	Open	Semi-Primitive Motorized

Table A.4 Cont'd: Designated Recreational Sites on The Carson NF

Trail Name	Site Type	Operational Status	ROS Class
Camino Real District			
Duran	Campground	Open	Roaded Natural
Upper La Junta	Campground	Open	Roaded Natural
La Junta Canyon	Camping Area	Open	Roaded Natural
Agua Piedra Cg	Campground	Open	Roaded Natural
Comales	Campground	Open	Roaded Natural
Santa Barbara	Campground	Open	Roaded Natural
El Nogal	Picnic Site	Open	Roaded Natural
[illegible]	Trailhead	Open	
South Boundary	Trailhead	Open	
La Cueva Th Beginning	Trailhead	Open	Roaded Natural
La Cueva Th Ending	Trailhead	Open	
Elliott Barker	Trailhead	Open	Roaded Natural
Devisadero	Trailhead	Open	
Cordova Canyon	Trailhead	Open	
Comales Th	Trailhead	Open	
La Vinateria	Day Use Area	Closed	Roaded Natural
Las Petacas	Campground	Open	Roaded Natural
Capulin	Campground	Open	Roaded Natural
La Sombra	Campground	Open	Roaded Natural
Trampas	Trailhead	Open	Roaded Natural
Placido	Picnic Site	Open	Roaded Natural
Agua Piedra	Picnic Site	Open	
Tierra Azul	Day Use Area	Open	
Pot Creek	Interpretive Site (Minor)	Closed	Roaded Natural
Sipapu Ski Area	Ski Area Alpine	Open	
Agua Piedra Group Area	Group Campground	Open	
Osha Canyon	Trailhead	Open	
Gallegos	Trailhead	Open	
Angostura	Trailhead	Closed	
Agua Piedra Trail Head	Trailhead	Open	
Us Hill Snow Play Area	Other Winter Sports Site	Open	
[illegible]	Trailhead	Open	
Amole	Trailhead	Open	Roaded Natural
Jicarrilla District			
Buzzard Park	Campground	Open	Roaded Natural
Cedar Springs	Campground	Open	Roaded Natural

Big Game

Species	License/Permit Type	Hunt Dates	Special Arms	Units	Permits
Bear	Private Land	Varies 10/28-11/13	Any Legal Sporting Arm	Units 4, 5A, 5B, 46,54,55	Units range 5-unlimited
Deer	Private Land	9/1-9/22	Bow	Units 46,54,55	Unlimited
Bear	Private Land	9/23-9/29	Muzzleloader and Bow	Units 46,54,55	Unlimited
Deer	OTC-Draw Permits	10/28-11/1 & 11/4-11/8	Any Legal Sporting Arm	Unit 51, 53, 54, 55, 56, 57	Units range 1-5,100
Elk	Private Land	Varies 10/1-1/31	Any Legal Sporting Arm	4, 5A, 5B, 46,51, 53, 54, 55A, 56, 57	Units range 15-150
Elk	Private Land	Varies 9/1-9/22	Bow	Units 4, 5A, 5B, 46, 48, 51, 53, 54, 55A, 57	Units range 10-225
Elk	Private Land	10/1-12/31	Muzzleloader	Units 48, 53	Units range 35-150
Elk	Public Draw	Varies 10/1-12/14	Any Legal Sporting Arm	Units 4, 5A, 5B, 48, 51, 53, 54, 55, 56,	Units range 5-250
Elk	Public Draw	9/1-9/22 & 10/1-10/5	Bow or Muzzleloader	Units 5A, 5B, 48, 53, 54, 55	Units range 10-225
Elk	Public Draw	9/1-9.22 & 10/1-10//5	Mobility Impaired	Unit 51, 53, 54, 55, 56, 57	30
Antelope	Public Draw	Varies 8/27-9/11	Any Legal Sporting Arm	Units 45-47, 53-57	300
Antelope	Public Draw	9/20-9/24	Bow	Units 45-47, 53-57	Units range 2-200
Antelope	Public Draw	9/20-9/23	Muzzleloader	Unit 52	175
Antelope	Public Draw	8/6-8/7	Mobility Impaired	Unit 45-48, 53-57	45
Turkey	OTC-Draw Permits	11/12-11/20 & 4/15-4/20	Any Legal Sporting Arm	Portions of Units 4, 55	20
Bighorn Sheep	Public Draw	9/8-9/18	Any Legal Sporting Arm	Portions of 53	Units Ranged 1-6
Bear	OTC-Draw Permits	Varies 8/1-11/15	Any Legal Sporting Arm	Zone 2	130
Cougar	OTC	10/1-3/1	Any Legal Sporting Arm	Zone B, Zone C, Zone P	Units range 5-58
Ellk/Deer	OTC	Varies 9/1-4/1	Allowable Trap Measures	Not well-specified	License for bycatch species

Small Game/Waterfowl

Species	License/Permit Type	Hunt Dates	Special Arms	Units	Permits
Quail	General Hunt	11/15-2/15	Any Legal Sporting Arm	Statewide	Not Specified
Dove	General Hunt	9/1-10/30	Any Legal Sporting Arm	North Zone	Not Specified
Band-Tailed Pigeon	General Hunt	9/1-10/20	Any Legal Sporting Arm	Regular Season	Not Specified
Blue Grouse	General Hunt	9/1-10/15	Any Legal Sporting Arm	GS-1	Not Specified
Squirrel	General Hunt	9/1-10/31	Any Legal Sporting Arm	GS-1	Not Specified
Pheasant	OTC-Draw Permits	12/8-12/11	Any Legal Sporting Arm	Statewide	Not Specified
Duck/American Coot	OTC	10/8-1/11	Any Legal Sporting Arm	GS-1	Not Specified
Falconry/Waterfowl	OTC	9/17-9/25	Any Legal Sporting Arm	GS-1	Not Specified

Source: Department of Game and Fish 2005 Hunting Regulations and Rules Handbook for Big Game and Small Game Waterfowl.

Notes: Bag Limit definitions follow below

Deer definitions: APRD (antler point restrictions) one deer with at least 3 points on one antler

Elk definitions: MB one male bull

A- one antlerless elk

ES- one elk, any sex

APRE- elk with 5 or more points on one antler

Antelope definitions: : MB- one male buck Antelope

F-M- one female or immature antelope

Notes: Wildlife Management Unit designations follow

Zone B (Unit 51), Zone C (Units 46, 48, 53-55), Zone P (Units 56, 57)

Zone 2 (Units 53-57) Zone 2 (Units 53-57)

GS-1 (includes Rio Arriba, Mora, Colfax)

Antelope Units

Big Game Units -

Colfax 54,55,57

Mora 45-48, 53

Rio Arriba 7, 52

Colfax 54, 55A, 55B, 56, 57

Mora 46

Rio Arriba 3,4 5A, 5B, 51

Taos 53

Table A.5: Hunting Regulations on the Carson NF

Table A.6: Grants and Agreements on The Carson NF

Grant & Agreement Number	Cooperator Cash Contribution	Cooperator Other Contribution	Cooperator Total Contribution	FS Cash Contribution	FS Other Contribution	FS Total Contribution	Total G&A Amount
99-CO-11030200-003	$491,155.00	$0.00	$491,155.00	$0.00	$0.00	$0.00	$491,155.00
	Cooperator/ Contributors:	KIT CARSON RURAL ELECTRICAL COOPERATIVE					
02-DG-11030200-001	$0.00	$0.00	$0.00	$333,988.00	$0.00	$333,988.00	$333,988.00
	Cooperator/ Contributors:	LA JICARITA ENTERPRISE COM, LA JICARITA ENTERPRISE COMMUNITY					
03-CS-11030200-005	$0.00	$28,600.00	$28,600.00	$24,000.00	$3,300.00	$27,300.00	$55,900.00
	Cooperator/ Contributors:	ROCKY MTN BIRD OBSERVATORY					
03-DG-11030200-002	$0.00	$91,535.00	$91,535.00	$294,673.00	$0.00	$294,673.00	$386,208.00
	Cooperator/ Contributors:	FOREST GUILD					
03-DG-11030200-003	$0.00	$90,052.00	$90,052.00	$270,992.00	$0.00	$270,992.00	$361,044.00
	Cooperator/ Contributors:	LA LAMA NEIGHBORHOOD ASSOCIATION, LA LAMA NEIGHORHOOD ASSOC					
03-DG-11030200-004	$0.00	$90,000.00	$90,000.00	$330,925.00	$0.00	$330,925.00	$420,925.00
	Cooperator/ Contributors:	TAOS BUSINESS ALLIANCE, TAOS BUSINESS ALLIANCE FOR ECONOMIC DEVELOPMENT					
03-DG-11030200-013	$83,250.00	$0.00	$83,250.00	$333,000.00	$0.00	$333,000.00	$416,250.00
	Cooperator/ Contributors:	QUESTA, VILLAGE OF, VILLAGE OF QUESTA					
03-DG-11030200-014	$135,300.00	$0.00	$135,300.00	$214,175.00	$0.00	$214,175.00	$349,475.00
	Cooperator/ Contributors:	SUSTAINABLE COMMUNITIES, SUSTAINABLE COMMUNITIES INC./ZERI					
03-IA-11030200-001	$0.00	$22,000.00	$22,000.00	$0.00	$0.00	$0.00	$22,000.00
	Cooperator/ Contributors:	USDI, BUREAU OF LAND MANAGEMENT					
04-CO-11030200-007	$5,000.00	$0.00	$5,000.00	$0.00	$0.00	$0.00	$5,000.00
	Cooperator/ Contributors:	CHUCK WAGON TRAIL RIDERS FOUNDATION, INC.					
04-CO-11030200-014	$190,473.73	$0.00	$190,473.73	$0.00	$0.00	$0.00	$190,473.73
	Cooperator/ Contributors:	NEW MEXICO DEPT OF GAME & FISH					
04-CO-11030200-015	$33,637.00	$0.00	$33,637.00	$0.00	$0.00	$0.00	$33,637.00
	Cooperator/ Contributors:	ROCKY MOUNTAIN ELK FOUNDATION					
04-DG-11030200-013	$99,400.00	$0.00	$99,400.00	$350,208.00	$0.00	$350,208.00	$449,608.00
	Cooperator/ Contributors:	TAOS CANYON NEIGHBORHOOD, TAOS CANYON NEIGHBORHOOD ASSOCIATION					
04-DG-11030200-016	$43,750.00	$0.00	$43,750.00	$175,000.00	$0.00	$175,000.00	$218,750.00
	Cooperator/ Contributors:	HEALTHY FOREST - HAPPY POTTERS, HEALTHY FOREST-HAPPY					
04-IA-11030200-001	$25,000.00	$0.00	$25,000.00	$0.00	$0.00	$0.00	$25,000.00
	Cooperator/ Contributors:	USDI, BUREAU OF LAND MANAGEMENT					
04-PA-11030200-011	$0.00	$0.00	$0.00	$304.00	$0.00	$304.00	$304.00
	Cooperator/ Contributors:	FOREST GUILD					
04-PA-11030200-012	$10,460.00	$0.00	$10,460.00	$0.00	$0.00	$0.00	$10,460.00
	Cooperator/ Contributors:	SIETE DEL NORTE					
04-PA-11030200-019	$100,000.00	$0.00	$100,000.00	$0.00	$0.00	$0.00	$100,000.00
	Cooperator/ Contributors:	NEW MEXICO ENVIRONMENT DEPARTMENT					
04-RO-11030200-017	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	TAOS COUNTY					
05-CA-11030200-003	$0.00	$0.00	$0.00	$10,000.00	$0.00	$10,000.00	$10,000.00
	Cooperator/ Contributors:	TAOS COUNTY SHERIFF DEPT, TAOS COUNTY SHERIFFF'S DEPARTMENT					
05-CA-11030200-005	$0.00	$0.00	$0.00	$4,500.00	$0.00	$4,500.00	$4,500.00
	Cooperator/ Contributors:	RIO ARRIBA COUNTY, RIO ARRIBA COUNTY SHERIFF'S DEPARTMENT					
05-CO-11030200-008	$20,000.00	$0.00	$20,000.00	$0.00	$0.00	$0.00	$20,000.00
	Cooperator/ Contributors:	AMIGOS BRAVOS, INC.					
05-CO-11030200-010	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	NEW MEXICO DEPT OF GAME & FISH					
05-CO-11030200-013	$150,280.00	$0.00	$150,280.00	$0.00	$0.00	$0.00	$150,280.00
	Cooperator/ Contributors:	NEW MEXICO ENVIRONMENT DEPARTMENT					
05-CS-11030200-009	$0.00	$0.00	$0.00	$19,350.00	$0.00	$19,350.00	$19,350.00
	Cooperator/ Contributors:	UNIVERSITY OF WYOMING					

Grant & Agreement Number	Cooperator Cash Contribution	Cooperator Other Contribution	Cooperator Total Contribution	FS Cash Contribution	FS Other Contribution	FS Total Contribution	Total G&A Amount
05-PA-11030200-012	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	ROCKY MOUNTAIN YOUTH CORPS					
06-IA-11030200-001	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	U.S. POSTAL SERVICE					
06-MU-11030200-005	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Cooperator/ Contributors:	TAOS PUEBLO					
06-CO-11030202-002	$9,000.00	$0.00	$9,000.00	$0.00	$0.00	$0.00	$9,000.00
	Cooperator/ Contributors:	ROCKY MOUNTAIN ELK FOUNDATION					
06-IA-11250200-014	$0.00	$0.00	$0.00	$17,000.00	$0.00	$17,000.00	$17,000.00
	Cooperator/ Contributors:	USDHHS FEDERAL OCCUPATIONAL HEALTH					
Grand Totals:	**$1,396,705.73**	**$322,187.00**	**$1,718,892.73**	**$3,383,115.00**	**$3,300.00**	**$3,386,415.00**	**$5,105,307.73**

G&A Count: 35